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IDRC

REPORTS

VOLUME 19, NUMBER 1, APRIL 1991



20 IDRC
YEARS OF DEVELOPMENT
THROUGH RESEARCH

Women Gaining Ground



P O B O X 8 5 0 0

Although this page of the magazine is usually reserved for letters from our readers, we felt that an explanation of the new "icons" would be of interest.

Focus



Each issue covers, as a special feature, a theme or "focus" subject. To give the reader a more in depth look at a particular issue, an overview piece is followed by several related articles that always carry the magnifying glass icon.

Developments



The building blocks of the development process are presented in this section where we focus on how projects have evolved and have gained international recognition, have reached a new stage, or have benefited from new insights and research undertaken elsewhere.

Technology



Under technology we look into the internal workings or "how to" of recent advances or improvements in small-scale technologies.

Profile



Each issue now presents a profile of a Third World researcher. Thoughts on the work place, professional and personal goals, and the cultural and family environment are shared with readers of similar backgrounds and those of very different lifestyles.

Commentary



To give the reader another point of view, this section offers expert analyses on a range of current development issues.

In Brief



The "briefs" present current events and IDRC-related or research and development-related activities of general interest to the wider development community.

Mail



As a new help to network research and to make information more accessible, each article provides a full mailing address, fax, etc. for the reader to follow up on current research by writing directly to the responsible persons in the field.

Books



As additional reference material, this icon gives suggested further reading either on the focus of the particular article or on a related theme.

Database/Audiovisual



When appropriate, this symbol will appear at the end of an article to lead the reader to existing databases or make note of the availability of audiovisual support materials.

With these and other more subtle refinements we hope to make information sharing among our readers even more effective. Your ideas for new departments and themes are always most welcome.

The magazine welcomes letters from its readers. Because of space limitations, letters may be edited or published only in part. Please write to IDRC Reports, PO Box 8500, Ottawa, Canada, K1G 3H9.

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Women, over the course of the past 20 years, have gained much ground in their own development struggle. But much has still to be won. The theme articles in this issue eloquently demonstrate that women from many different milieus are taking charge of their own destinies. They are clearly essential contributors in the fight to solve the problems of development in the countries of the South.

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INTEGRATING GENDER INTO DEVELOPMENT



When we look back at 20 years of studies on the roles, contributions, and needs of women, the question emerges: What has been learned from all of this activity as we begin a new decade?

In 1991, it is known that women in developing countries work longer hours, earn less money, have greater responsibilities, are less literate, and have lower caloric intake in proportion to body weight than do men. In situations where everyone must work long hours to secure sufficient income for basic needs, women must work even longer. They are faced not only with the necessity of contributing to household income but also with the responsibility for all or most of the reproductive labour, including bearing and caring for children, preparing of food, looking after the elderly, nursing the sick, and the multitude of other tasks that are labelled "women's work" in most parts of the world.

Much of this has been brought to public awareness through research and the increasing influence of local and national women activist groups. But what has really been accomplished? Are we better prepared and equipped today to integrate women into development strategies? Has the active participation of developing-country feminists changed the focus of development initiatives for women?

Women's groups in different parts of the world are struggling with the answers to these and other questions. Some of the key issues in gender and development include economic opportunity and equality, women's legal rights, social participation, and the relationship of women to the environment. It must be recognized, of course, that regional and national priorities and customs vary and that the approaches taken to some of the same problems are markedly different. Nevertheless, some general strains of importance can be acknowledged.



Here, Sri Lankan women are producing handpump components through an NGO encouraging economic independence for women.

Economic Position of Women

The impact of the global debt crisis and structural adjustment policies on the condition and status of women has received increasing attention. It has been argued that women have suffered disproportionately from the debt crisis and adjustment policies, not only as producers or workers in formal-sector employment but also as reproducers who have been forced to provide, on a private basis, social services previously provided by the state.

Caribbean feminist researchers have been particularly active in addressing this issue. Economic participation and women's economic survival strategies have been significant recurring themes in their work. High levels of female-headed households, combined with male unemployment and migration and relatively high female education participation rates, have led to a substantial integration of women into Caribbean labour markets, although mostly at poorly remunerated levels and frequently within the informal sector. In the face of economic crisis, Caribbean women

have been vulnerable not only as principal family income earners but also as household managers who have had to provide for basic family needs with seriously reduced resources.

Several Caribbean projects currently being supported by IDRC examine these issues (see page 13).

Latin American researchers have focused on the impact of the debt crisis on women's participation in formal labour markets. Research in Brazil has shown that women have been integrated into formal labour markets at lower salary rates and with little job security. During the economic boom period of the early 1970s, large numbers of Brazilian women entered formal employment through the industrial sector. However, this was accompanied by a marked wage discrimination by gender with women commonly working similar hours but earning substantially smaller salaries than men.

In Africa, there also emerged a strong feminist critique of the structural adjustment policies imposed by the International Monetary Fund (IMF) and the World Bank. Research showed that women tended to be concentrated in the lowest levels of public sector employment, where layoffs were most

profound. Consumption patterns shifted to cheaper basic staples that required longer preparation time, again immediately affecting women's work. Health services were cut back and women were denied care for themselves and asked to assume greater responsibility for the care of others. This became of increasing importance in the AIDS crisis of the 1980s when many families were forced to take care of victims of the disease.

During the 1980s, there continued to be a great deal of research on women's role in agriculture, on women's informal-sector employment, and, increasingly, on women's entrepreneurship. Researchers in different regions pointed to the handicaps faced by women in attempting to obtain credit, in getting access to new agricultural technologies, in reconciling productive with reproductive responsibilities, and in coping with the immediate microimpact of the global economic crisis. There also was a growing awareness among feminist researchers of the need to influence national policymakers to improve the working conditions of women.

In general, the approach taken by feminist researchers differed from that of traditional economic researchers insofar as they focused specifically on the impact of structural adjustment policies on women. They attempted to assign economic value to the extra burden and stress imposed on women as a result of macroeconomic policy measures. "Engendering Adjustment for the 1990s," a report of a Commonwealth Expert Group published early in 1990, provides an excellent overview of the impact of such policies in Commonwealth countries.

Women's Rights

In many regions, women continued to suffer from legal discrimination in the 1980s, either because laws had not been modernized to give them equal rights or because equal rights laws were not applied. This is particularly true with respect to land rights but, discrimination occurred on many other levels, including employment, wages, and pension benefits. In other cases, women have been denied basic human and political rights and virtually everywhere continue to suffer from domestic violence. This is usually not recognized by local authorities as a serious, punishable crime.

In Africa, land tenure continues to be an issue of frequent legal contention (see page 10).

IDRC projects in Ghana, Nigeria, Senegal, Cote d'Ivoire, Tanzania, and Kenya are examining land tenure systems and women's access to land ownership. The researchers are studying the extent to which the legal and cultural constraints placed on women's farming capacities hamper their ability to make effective contributions to agricultural production. These studies are underscoring the relationship between women's access to land and food security.

During the past decade, there has emerged in Asia a strong concern with the gap between women's legal rights as stated in statutory laws and the actual implementation of those rights. An IDRC project in northeastern Thailand is examining the contradictions among statutory laws, customary laws, and village practices. Preliminary findings suggest that village women continue to be discouraged from participating in decision-making processes by virtue of their own tradition-based reticence and the continuing observation of customary laws, despite the existence of statutory laws giving them full political rights. A comparative project based in China and India is examining women's access to land tenure within differing social, political, and economic contexts. Early findings suggest that Chinese women are particularly vulnerable with respect to land rights.

In Latin America, feminist scholars focused attention on political and human rights, especially in the context of the authoritarian regimes present in the region at the beginning of the decade. Probably the best known example is that of the Mothers of the Plaza de Mayo in Buenos Aires who weekly circled around the plaza in protest against the disappearance of their children.

Social Participation

The social and cultural position of women continued to be of interest to feminist researchers during the 1980s. Despite some regional variances, most feminist researchers were exploring



The declining economy and structural adjustment policies often mean that women are limited to only the lowest paying jobs.



In Africa, the contribution of women in agriculture is now more widely recognized. More value is now placed on indigenous women's knowledge about the environment around them.

the basis of women's subordinate cultural position and examining women's efforts to improve their own status. In Latin America, there was interest in the changing power relations between men and women emerging from increased urbanization and greater absorption of women into formal labour markets.

A project in Chile has examined the portrayal of women in the media and is measuring the extent to which women's self-images are influenced by the standard stereotypes in popular soap operas. Considerable emphasis is being placed on the conflicts between women's societal roles, the official ideology of the state with respect to women and gender roles, and the systematic devaluing of women's self-image through an essentially negative or patronizing media portrayal.

In Asia, cultural and religious definitions of gender roles remained of compelling concern. Changes in gender roles over time also have been analyzed. Indian scholars have shown that, historically, there existed a strong matriarchal tradition that has eroded with the emergence of powerful patriarchal economic interests. In the Philippines, research has focused on gender inequality, class domination, and the predominance of foreign over national interests. Other social participation issues receiving attention in Asia include decision-making and work patterns within the household, the conceptualization of the value of work, and competition in social relations among women. In some countries, there has also been a growing commitment to the study of prostitution and the commoditization of women.

Environment

It became increasingly evident during the decade that men and women have different attitudes toward the environment and natural resource utilization with respect to expectations, needs, and motivations. Although this has been recognized by various researchers and by environmental activist groups, there has been little systematic information-gathering on how women interact with environment and natural resources.

Nonetheless, in Africa there has emerged a growing concern with environmental degradation and with the necessity to regain control of rapidly eroding natural resources. African feminists have drawn attention to the close relationship of African women with natural resources, to their utilization patterns, and to the immediacy of the impact of desertification and deforestation on women's work and livelihood.

A higher level of education is permitting women in the South to contribute to more areas of research.



Several current IDRC projects address these issues. WEDNET, the Women, Environment and Development Network, was established in January 1989 to support research on the identification and legitimization of grass-roots African women's knowledge about the environment. The WEDNET projects, currently underway in anglophone and francophone Africa, focus on indigenous women's knowledge concerning management of water, forestry, and crop systems. They attempt to examine the knowledge already held by African women and avoid the more usual tendency to dismiss traditional knowledge systems.

The relationship between gender and environment also has emerged as a concern in some Asian contexts. For example, an ongoing IDRC project in India is examining the impact of environmentally damaging strip mining operations on women's farming practices in a remote mountainous region. Researchers have found marked differences in the attitudes of men and women toward the development of mining operations. Women tend to take a longer term view, measuring the cost of environmental destruction and loss of agricultural lands against the short-term benefits of male employment.

Toward a New Vision of the Future

A refreshing trend in the 1980s was the significant proportion of "women in development" research being carried out by Third World women themselves rather than visiting researchers from the North. A key development in this area was the use of participatory research methodologies designed to break down and eliminate the traditional divisions between researchers and the subjects of research. "Action research" has also become more prominent. Frequently, such research has been undertaken by NGOs or women's groups with limited research experience. A good example of this can be found in the work of SPARC, an Indian NGO based in Bombay committed to improving the living standards of pavement dwellers (see page 8). In essence, such groups have "learned by doing" and in the process have developed new insights into women's life experiences and feminist scholarship.

In the 1980s, feminist researchers collected voluminous information about the conditions, perceptions, and needs of women. They began to organize this information into specific understandings about the social relations of gender in different parts of the world. Women organized themselves more effectively than ever before, and their voices were heard in social movements around the globe. The NGO Forum at the

End-of-the-U.N. Decade for Women at Nairobi in 1985 was a celebration of women's growing strength and solidarity. In the 1980s, women moved closer toward self-empowerment.

But feminist researchers and activists must work toward greater progress. In my view, a feminist vision for the future must be based on the more coherent articulation of what we already know. Our task during the 90s, as female and male feminists, must be to bring our experience, knowledge, and values into the mainstream of global decision-making. We must be both researchers and activists and we must point in the direction of a more equitable sharing of the world's dwindling resources. It is a daunting challenge for the 1990s. But it is one that must be faced.

Eva Rathgeber, Coordinator, Gender and Development Unit, IDRC, Ottawa



This article is an abridged version of "Integrating Gender into Development: Research and Action Agendas for the 1990s" by Eva Rathgeber.

"SPARC" OF HOPE FOR INDIA'S SLUM DWELLERS



Women squatters in a Bombay street — "E ward" was the first initiative of "SPARC" in its efforts to help impoverished women help themselves.



"Home" for the more than 100,000 pavement dwellers of Bombay, India, is a leaky shelter haphazardly located on busy city streets. Women here live in two kinds of poverty — the economic impoverishment of marginal incomes and the equally oppressive social neglect of municipal authorities.

But an IDRC-sponsored project is actively involved in changing this situation. "Women and Urban Poverty" is a project by a group called SPARC — Society for the Promotion of Area Resource Centres. It is a nongovernmental organization (NGO) that works directly with the urban poor in cities like Bombay. SPARC's dynamism lies in its ability to act not merely as an advisory body but as a tool for the empowerment of local women.

"Before our organization was set up, when a woman saw a policeman her hand went into her pocket to see how much she had to bribe him," SPARC director Sheela Patel says. "Now she goes to a police station and is offered a cup of tea."

Teaching pavement and slum dwellers about their rights in the face of authority is one of the key objectives of this SPARC project. Indeed, it was the arbitrary removal of pavement dwellers' property by the Bombay Municipal Corporation that led to the creation of SPARC.

In 1981, the municipality decided that pavement dwellings were illegal and started demolition and eviction drives. Civil liberties groups took the matter to court and were able to secure a stay on demolitions. In 1985, however, the Supreme Court withdrew the stay and gave the state the right to remove the dwellings.

It was during this period that a group of people from such diverse backgrounds as counselling, community health, child welfare, and biomedical science decided to form SPARC. "Most of us had worked with other institutions in the area and found the welfare approach did not work," Patel says. "The attitude of the government welfare agencies is one of hesitation in taking up the issue of pavement dwellers." But SPARC took on the task and the results have been impressive.

The SPARC team covered 6000 households and nearly 27,000 individual slum and pavement dwellers, asking questions about background, income, family structures, and other things that no one had bothered to find out before. They formed an information base to chart out the requirements of pavement dwellers.

They quickly realized that women needed knowledge about access to certain necessities. Most women, they found, were unskilled migrants from rural areas of India. They were unable to tackle day-to-day problems like admitting a sick child to hospital or talking to municipal authorities.

SPARC workers taught pavement dwellers how to fill out ration cards (which provide access to subsidized foodgrain) and bank loan and electricity forms. In addition to giving families cheaper food, ration cards also establish identity and a place of residence. This is critical for those squatting on government land hoping to get legal ownership of a small plot.

In the wake of slum demolitions, women have begun to become increasingly aware of, and militant about, their legal entitlements.

In 1989, a group of women pavement dwellers in the "E ward" slum took the municipality of Bombay to court over demolition of a number of street shelters. Trained by SPARC, the women had noted the number of the municipality van that took their belongings away and made a detailed list of goods taken from each dwelling. The women won their case and were given back their property. "Nobody believed we could organize slum dwellers on such a large scale," Patel says.

SPARC was also instrumental in creating Mahila Milan, an organization designed to create a stronger lobby force for women pavement dwellers. It began in the "E ward" slum and moved to other impoverished areas of Bombay like Dharavi, Wadala, Goregaon, Mankhurd, and Chembur.

"Nobody listens to us when we are alone but now we are organized and strong," says Laxmi Naidu, a resident of the "E ward" slum in Bombay and Mahila Milan member. "Singly, we were thin sticks which could easily be broken — together we are like a thick, unbreakable bundle."

One aspect of this unity is the encouragement by Mahila Milan of savings for housing — the largest single problem of pavement dwellers. Representatives like Leela Naidu collect small savings from the members each month and deposit them in a common housing fund.

"No matter how small the amount, the collective savings add up over a period of time," Naidu says. "In 4 years we have saved up RS450,000 (US\$25,000) for housing."

The women also put together about RS40,000 (US\$2,222) for daily emergencies. Whenever a member needs money for medicine, goods to sell, or children's schoolbooks or clothes they can borrow it from the account at a nominal interest rate.

The loan scheme is useful because many of the women in the pavement dwellings survive on extremely limited incomes. According to SPARC surveys, 74% of the slum dwellers earn less than the minimum wage of RS18 per hour (US\$1). Women make up 27% of the workforce but more than 90% earn less than the minimum wage.

With SPARC's help, Mahila Milan has started income-generation projects for women, teaching them to stitch and to make files, folders, and decorative items. Adult education classes are also offered.

But the economic barriers confronting women slum dwellers are just one part of the overall problem in urban planning, according to SPARC coordinator Mithu Gupta. "Whenever resettlement plans are made, the houses are designed according to middle class perceptions of urban living," she says. The leader of the National Slum Dwellers Federation (NSDF), A. Jockin echoes this thought. "Urban planners decide arbitrarily what is good for the poor, based on global patterns. But this macrolevel planning often does not synchronize with the needs of the urban poor."

The NSDF works with SPARC in research, negotiation, and other activities. Jockin believes that the way to fight municipal and urban planning ignorance is to help slum dwellers participate in decisions regarding policy and implementation. "The groups among the pavement dwellers have certain resource limitations," he says. "So we take over."



"Nobody believed we could organize slum dwellers on such a large scale," says SPARC director, Sheela Patel.

GAINING GROUND

Jockin recounts one example where the NSDF and SPARC participated in meetings related to a World Bank project for adequate housing for the poor. "Our coordination with SPARC allowed 10,000 people to apply for housing in the project," he says. "On their own, local people would not have known how to complete the formalities."

Jockin also notes how collaboration has given NSDF new perspectives. "Until recently organizations like ours were male dominated," he says. We only used women for demonstrations. But now we want them to take leadership roles."

Women's assumption of leadership roles in negotiation with authority is one of the key benefits of this SPARC project. Patel says government and municipal authorities are grudgingly but increasingly supportive of the plight of pavement dwellers. "The whole idea of SPARC and this project is to get women on the negotiation table and to create relationships in which we can argue our position extensively," she says.

"We see our role as one of education on both sides. The officials are learning to negotiate with the poor and vice versa."

Deepa Gablot, a freelance writer based in India



Zipporah Mutanga Musembi lives in the Machakos district of Kenya where she worked with her husband on their 4.4 hectare farm for 6 years. When he secretly decided to sell the farm and move away, she was left with nothing. The new "owners" of the land came and demolished her home, forcing the older children to leave the only house they knew. Musembi had to move in with her older married sister.

Musembi's example, according to IDRC project researcher Elizabeth Nzioki, is not exceptional. It is the story of many rural women around the world who are constrained in their ability to own and control land.

Nzioki began the project, called "Access to Land Ownership in Kenya," in 1987. Nzioki conducted research in the Mumbuni area of the Machakos district of Kenya, where she interviewed rural women in the context of land tenure reform.

The project has focused specifically on how land tenure reform has affected women's relationship to land and its implication for agricultural work done by women.

Land tenure reform legislation was introduced in Kenya in 1954 and it was designed to transform customary land tenure to statutory free hold through land adjudication, consolidation, and registration.

A key development in Kenyan land tenure reform was the issuing of title deeds in the name of the "head of the family."

"The problem with the legislation," Nzioki notes, "is that the titled land is being transferred almost exclusively to male individuals." There is no provision for how women's access rights are to be defined or for how the land is to be divided after a married couple has separated, she says.

This has led to an "individualization of land" in which male individuals, through the title deed, now have full power and legal rights over family land. Nzioki says there are a number of implications for women.

The first is that because most land is inherited by the male head of the family and not bought, women rely on men for land. "In this country, women do not inherit land but are almost completely dependent on their husbands, brothers, or in-laws to give them land and to let them farm," Nzioki says.

A case in point is Theresa Wayua, a single mother of six. She was pregnant when she dropped out of secondary school and was sent away for having shamed her family.

"After the death of my parents" she recalls, "one of my brothers gave me a patch of land where I could build a small house. I work on coffee farms as a casual labourer for only 200 Kenyan shillings (US\$10) a month." The brother is now urging her to move as he wants to use her land for another purpose. Wayua, like many other rural Kenyan women, is dependent on a male relation for access to land.



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Ngiti Musyoki in her "shamba" (farm) with a member of the research team.

Many women, like Wayua, work on large farms, making little income. Nzioki concludes that, however good the land legislation is, these disenfranchised women will rarely benefit. "The few women who have benefited are the economically better off — those with urban connections. Generally, rich farmers have gained at the expense of poor farmers, those with access to education and political power have gained at the expense of those who do not, and men have gained at the expense of women."

Instead of their traditional role as agricultural farmers and producers, women have been transformed into simple labourers on cash-crop farms. "The title deed is a legal instrument which has empowered men to have control over not just land but another resource — women's labour," says Nzioki.

Most land that women do own is often of poor quality, further hindering women's productive capacity. "Lack of decision-making power on land use is pushing women to marginalized land and decreasing their traditionally high agricultural productivity," Nzioki says.

After her husband left her with a mentally retarded and a physically disabled child, Ngii Musyoki was forced to move to another area 4 kilometres away. Without income to buy or lease land she found a free, swampy piece of land and claimed it as her "shamba" (farm).

Although Musyoki has farmed this land for more than 20 years, she does not legally own it. She is what the municipality calls a "tenant at sufferance" and can be evicted from her farm at short notice. She is also not permitted to plant cash crops like coffee or bananas — imposing a serious constraint on her income.

The fact that Musyoki has little control of her own land is a reflection of the government's lack of understanding of the agricultural contributions of women, Nzioki says. "This does not augur well for the government's policy on nutrition and food security where the strategy is to increase and diversify food production at the household level so that rural families are properly fed," she says.



Theresa Wayua holding a meeting with the research group near her home.

Musyoki has been sending emissaries to the district commissioner in Machakos for an appointment to discuss her "shamba." So far, the only government official she has been able to talk to has assured her that she can work her farm until 1993 without fear of eviction.

The fact that Musyoki cannot discuss her land claims with government officials does not surprise Tom Kyule, a member of Nzioki's research team. He says that among the 150 women interviewed, none had received training for new farming techniques nor had they talked to extension officers. "One of the women told me that the extension worker wanted to talk with her husband, despite the fact that he lives in Nairobi and comes home only once every 2 months."

Kyule explains that this is often because the extension workers have the names of the owners of land parcels, usually the males in the family. The owner of the land title, however, is not always the one that actually farms the land, Kyule says.

Despite the obstacles facing women, Nzioki remains positive that her research work has done much to create awareness among women. Interviews with rural women farmers leads Nzioki to speculate that Kenya may see resistance to certain land sales in the future.

She says that the research is policy oriented, with the results communicated to the law reform commission in a bid to raise the status of rural women. "These women contribute a lot to the economy of this country," Nzioki says with anger, "but they are rarely acknowledged." Her project's key thrust is to reveal the systematic discrimination against women to government and society. Nzioki fervently hopes that this awareness will lead to greater confidence among Kenyan women and fairer land legislation.

Rebecca Katumba, a freelance writer based in Kenya



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Shimwaayi Muntemba recounts the development of the "Citimene" system of soil conservation in Zambia with pride and anger. She is proud because it symbolized the effective, indigenous use of tropical soil by the African people. Her anger stems from the subversion of this agricultural technique by colonial interests and the resultant unproductive and acidified soil in South Central Zambia.

For many years, the farmers of Zambia logged trees, burned the branches, and used ash as a fertilizer for the soil. "Due to the nature of the soil, the Citimene method worked well and land could be used for 5 years before being left to rest," Muntemba, the executive director of the Nairobi-based Environment Liaison Centre (ELC) enthusiastically explains. "Crops rarely failed in this part of the country."

Muntemba's enthusiasm wanes as she points to the acidification of soil in large-scale farms in the Kabwe region of Zambia. Farms have been abandoned and workers have migrated to urban centres where they can barely survive. Muntemba's country has now joined a long list of African food aid recipients. Food riots are common.

What happened? "Without bothering to find out why the farmers used the Citimene system," she says "the colonialists dismissed it as backwards and destructive. They promoted chemical fertilizers which acidified the soil. Now that they have left we must try and regenerate the soil."

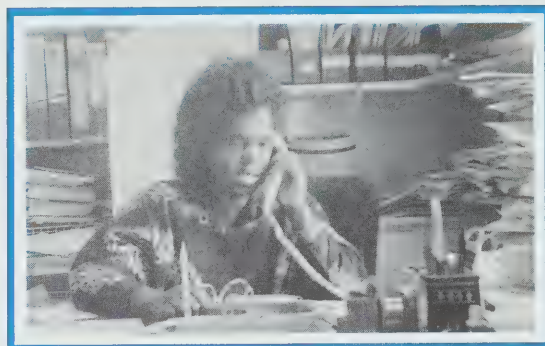
Muntemba points out that tropical soils are very fragile and require a variety of agricultural techniques. Indigenous methods must be studied, not dismissed, she says emphatically. Only then can new techniques be introduced to ensure sustained agriculture. "People" Muntemba emphasizes "must be part of this strategy of agricultural development."

This is a powerful message by a woman whose rich experience in rural agriculture is matched only by her commitment to improving the role of women in international development.

Muntemba has a wealth of knowledge in dealing with rural agriculture and people. Whether it be at the University of Zambia's Rural Development Studies bureau or as an expert in rural employment with the Independent Labour Organization in Geneva, Muntemba has always seen the "process of development through the eyes of the small-scale farmers." Muntemba's PHD thesis concentrated on rural underdevelopment. She realized that "whenever there was a struggle, the peasants lost out. Land was taken away and they became labourers on large-scale farms or worse were dragged into the South African economic system."

One of the highlights of Muntemba's career was her work on the Brundtland Commission. She coordinated much of the research on food security, agriculture, environment, and women. "When I began to work at the commission things fell into place — the direct link between environmental degradation and rural underdevelopment."

After her work on the commission she went south to Kenya, accepting a position as the director of the Environment Liaison Centre in 1987. Her appointment reflected the importance the organization has attached to the involvement of women in development.



Shimwaayi Muntemba, executive director of the Nairobi-based Environment Liaison Centre.

At the ELC, Muntemba drew up a 3-year program for women and environmental work. She says the program emphasizes putting people's knowledge first. To bring this knowledge of women into the core of development, ELC started WEDNET, a multinational and multidisciplinary research project on women and natural resource management in Africa. The project is funded by the Gender and Development (GAD) unit of IDRC.

Muntemba stresses that the growing and widespread recognition of women as key players in the management of natural resources has been undermined and trivialized by power and policy structures at all levels. "The search for strategies to halt environmental degradation and introduce sustainable development to Africa must begin by recognizing and legitimizing women's knowledge," she says.

WEDNET's main purpose is to strengthen the role of indigenous knowledge in international development. Women researchers, beginning in May 1989, have done research in Senegal, Burkina Faso, Mali, Ghana, Nigeria, Tanzania, and Zambia. Muntemba is encouraged by the project.

The bulk of WEDNET's research is concentrated on day-to-day activities such as management and conservation of livestock, water, harvest, soil, food security, nutrition, health, and technology.

A computerized information-sharing network is being established with ELC and the Canadian counterpart in the project, York University. Muntemba hopes that the information system will allow African researchers to share their knowledge with new techniques and developments in Canada. This cooperative kind of development strategy is light years ahead of the destructive and insensitive policies of industrialized countries in the past. Muntemba points out that if the colonial farmers in her homeland of Zambia had followed this path the story of Zambia's agricultural development would have been different today.

Muntemba is committed to using WEDNET and her position at the ELC to heighten the awareness and legitimation of women's indigenous knowledge in Africa. "We have come a long way since the 1970s when women began to be discussed as central to agriculture," she says confidently. "Now there is an actual appreciation of the fact that women's economic and agricultural activities are located within the context of environmental sustainability."

Rebecca Katumba, a freelance writer based in Kenya

WEATHERING THE ECONOMIC STORM



The recession that hit Latin America and the Caribbean in the early 1980s was the worst economic crisis since the Great Depression of the 1930s. But the effects of this recession were not spread evenly across all sectors of the economy. Many of the negative consequences of the economic slowdown weighed disproportionately on an economically vulnerable group: low-income women.

An IDRC-sponsored project, entitled "Weathering Economic Crisis," set out to trace some of these effects on women in Barbados, in the hope of pointing the way to some policy changes. The project consisted of empirical studies of the Barbadian economy and of surveys of women who had been affected by the recession.

The negative impact of the economic slowdown on women, according to project leader Dr Joycelin Massiah, was "sharp and immediate." These effects included the inability of women to meet household costs, exposure to poor working conditions, and the strains on women's traditional role as care-givers.

A key area of vulnerability was the manufacturing sector, a sector with one of the highest percentage of female employees.

Manufacturing had established itself as one of the more dynamic sectors of the Barbadian economy in the 1970s. But, by the early 1980s, manufacturing began to decline because of reductions in foreign demand and a weakening of the regional market following the international recession. By the mid 1980s, the sector was experiencing shorter hours of work, widespread lay-offs, and permanent closures. The downward trend in this sector had a significant influence on women.

During the 1970s and 1980s, women accounted for more than 85% of the jobs in the garment industry, more than 55% in the electronics industry, and more than 75% in "miscellaneous industry." This was seen by many as an economic boom for women but it ignored an all-too familiar scenario. Many of these women were

concentrated in lower wage positions, making them the front-line for company lay-offs. According to Massiah's project, some 85% of the women in industry were employed in production-oriented work, whereas only 1% were in professional, technical, or administrative positions.

In the garment and electronic industries, the two most highly intensive employers of female labour, more than 80% of the jobs were lost in 1989 alone, the majority being women. The international electronics firm, Intel, and a lingerie manufacturing company, Playtex, closed their doors, leaving many female specialized workers without employment.

The initial reaction among many factory workers to job loss was relief at being released from the poor conditions of the manufacturing plants. "Respondents to the survey were unanimous in their condemnation of the general working conditions," Massiah notes. Low wages, artificially extended periods of training, high production quotas, obsolete equipment, limited lunch and bathroom breaks, and health problems like backaches, eyestrain, and headaches were all included as contributors to an oppressive work environment. Women interviewed in the survey were adamant in their determination not to work in a factory again.

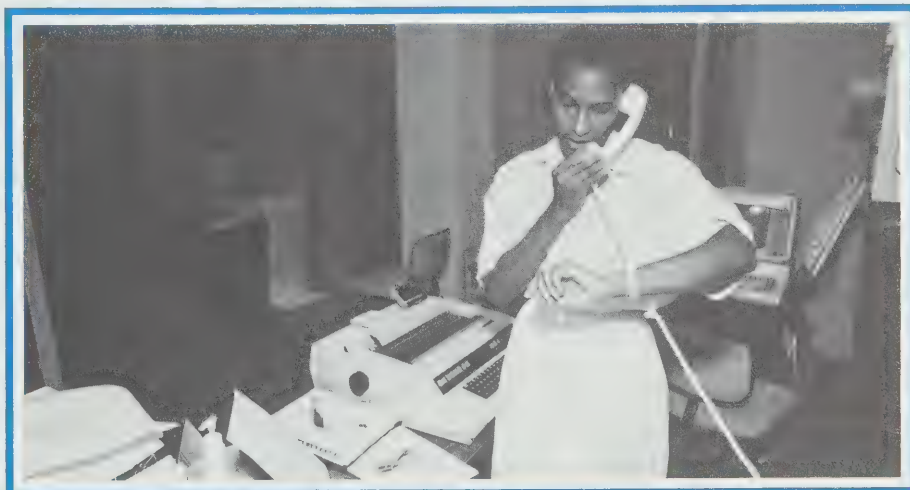
But the initial relief from the poor conditions was quickly translated into lean incomes for many women. Massiah says that lay-offs often led to "an inability among many women to meet the rising costs of the basic needs of their households." More than 10% of the sample survey of 160 women said they were unable to live adequately after the recession.

There were also significant changes in household spending and saving patterns. A greater percentage of household expenditures were going toward necessities like food.

Twenty-five per cent fewer women were saving money at the time of the survey than in prerecession times, says Massiah.

To deal with some of the economic hardships imposed by the recessionary lay-offs, women followed a number of strategies. "Their preference was to resort to traditional survival strategies using their own skills, rather than adapting to new and untried schemes," notes Massiah. What this actually meant was a keen reliance on income support from family and friends. "It was clear from the survey that the network of boyfriend, parents, and siblings featured prominently as a critical support mechanism," Massiah says.

Continued on next page



Structural adjustment politics are seriously undermining the gains of women.

But many women engaged in income-generating ventures in the informal sector, one of the Barbados' fastest growing sectors. Women turned increasingly to buying and selling clothing and cosmetics, cottage industries, small-scale garment manufacturing, modelling, and hairdressing. "In the process, these women exhibited considerable resourcefulness and a fierce determination to succeed," Massiah says.

Massiah also noted that some of the women have benefited from these alternative ventures in the informal sector. According to employment bureaus and loan agency officials, requests by women for skills training and loans to develop cottage industries had increased substantially, whereas registration for low-paying jobs had declined.

The recession of the 1980s has caused definite changes in the roles of women in the Barbadian economy. Women have increasingly shifted toward self-employment and informal strategies, mainly because of the overwhelming lay-offs in the manufacturing sector. This shift has revealed the poor working conditions of most factory labourers and the strain of increased care-giving demands stemming from government cutbacks. Although the Barbadian government was not forced to slash its social services spending, Massiah says there are results from other Caribbean and Latin American countries that show considerable spending cuts on critical government services like health care. Women, in the traditional role of care-givers, are often forced to pick up the slack.

Massiah says that future government economic policies must take into account the unique positions of women in the Barbadian economy. The

manufacturing sector is a prime example, Massiah says. "If manufacturing is to play a key role in efforts to revitalize the economy, then special strategies must be pursued to persuade women to reenter the sector."

But it is equally essential to understand women's alternative strategies for survival. According to Massiah, "There is a need to undertake in-depth studies of the conditions and requirements of those women working in the informal sector." It is only through this kind of knowledge that assistance programs appropriate to the formative cultural traditions of displaced women can be designed and integrated.

The project's survey of Barbadian women was part of an increasingly constructive trend in studying women and development: putting the voice of grass-roots women into the definition and examination of research questions and problems. Throughout the project, the perceptive responses of women to their own situations has raised awareness of the vitality of their participation in the economy and the importance of their unique survival strategies.

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In Beijing, a young woman about to get married explains with mixed feelings that she is finally buying a refrigerator. She is happy to be getting a new one, but frustrated because she has to decide between a dented one and a model that leaks its cold air. She could complain, but it would lead her nowhere because China lacks warranty laws that would back her.

Stories like this are frequently heard in China.

Poor-quality goods — the most worrisome being outdated and improperly prepared comestibles, often leading to poisoning — is one of the most pressing problems for the Chinese. Their plight is a result of the lack of product warranty laws. But this consumers' predicament is part of a greater difficulty in China: an economic reform policy that aims for higher productivity but lacks the legal authority to transform the way business is conducted.

LEGISLATING REFORM IN CHINA



Aware of this mismatch between policy and law, the Chinese government in late 1987 — nearly a decade after it decided to relax its economic management, and 1 year after it ratified the reforms — began sending teams of legal scholars to the Queen's University Faculty of Law in Kingston, Canada.

The researchers from Beijing's Economic Legislation Research Centre went to study Canada's experience with corporate, banking, and product liability laws and to learn the intricacies of drafting legislation in market economies. The goal of the IDRC-supported project was to help draft laws to entrench formally reforms that, without legal support, would be left as mere aspirations.

"When we decided to reform and open ourselves to the outside world we decided to strengthen our legislation," says Li Pei Chuan, deputy director of China's State Council Bureau of Legal Affairs. China lacked, for example, laws governing the formation of a private company, legislation to protect banks in their

expanded role of providing more business capital, and statutes to prevent consumers from getting stung by manufacturers and importers selling mediocre goods.

Project leader and Queen's professor of law Tung-Pi Chen says China already has an informal system of business regulation, but it is inconsistent and needs to be dismantled for reform to occur. "There are rules, but they are unwritten rules made by bureaucrats. It's like a regulation put out by City Hall. You get a different administrator and then suddenly you have a new rule," says Chen.

Over 3 years, 15 Chinese legal scholars visited Canada. With the help of Queen's University's Faculty of Law and lawyers from a prominent Canadian legal firm, they drafted corporate laws, banking laws, and product liability laws.

The Chinese State Council already has the researchers' final draft of the proposed corporate law on its agenda for approval at the end of 1990. The draft covers only limited liability corporate law (companies in which profits, losses, and taxes are the responsibility of the company, not the owner) but still lacks regulations for partnerships (which are unlimited in that the owners must pay tax, endure losses, and reap profits). China's priority is limited corporate law because it is trying to attract foreign companies, most of which are limited corporations.

The scholars prepared two drafts of a banking law that will govern lending money to enterprises. The law would allow banks to secure assets as a form of collateral. But banking law has greater implications beyond seemingly simple security for banks. Because the reformed economy reduces state investment and calls for enterprises to raise capital from domestic or foreign markets, the Chinese banking system must first be brought up to date with the reforms.

Passing bank lending laws is seen as crucial because it would add a sizable source of capital to a limited pool of funds. Bank financing could become a main recourse for capital-hungry

enterprises, especially because the sale of shares to raise capital is nonexistent except in half-a-dozen experimental regions. Professor Chen says permitting the sale of public shares "is a very sensitive issue because it challenges the purity of public ownership."

The draft of the product warranty and liability law is so comprehensive — containing more than one hundred articles — that it is now being rewritten for the seventh time. It is expected to be approved by the National Peoples' Congress in March 1991. With it, the Chinese can begin to expect relief from one of their most bothersome conditions, poor-quality goods and the abundance of fakes. But relief will probably come considerably later because the basic problem facing China is that demand exceeds supply. Says Chen: "When that occurs, the law takes a back seat." Deputy director Li says China knows reform cannot be expected to occur overnight. "We are in a transitional period from an old to a new system. This leaves some inconsistencies and they need attention to make it perfect and complete." To those impatient with the speed of change he offers a proverb: "In China we have a saying. We have to draw on useful experiences from our history and from other countries. But before we can use them, we have to first digest them."

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FAULTY SPRAYERS



A Malaysian farmer complains of dizziness and nausea. He blames his condition on the pesticides

he applies to his rice fields. What he does not consider, however, is that substandard equipment may be the root of his problem.

The farmer might have escaped pesticide poisoning if he had used a higher quality of knapsack sprayer.

About US\$120 million of pesticides are sold annually in Malaysia, where they are used by both small-scale farmers and spray gangs on plantation estates. The pesticides are commonly applied with hand-held knapsack sprayers. More than 96% of the sprayers are locally manufactured and their quality ranges from poor to moderately good.

As farmers choose affordability over quality, many use inferior sprayers that increase their chances of being contaminated by pesticides.

"Popularity depends on price," says Dr Mohammed Jusoh Mamat, the senior research officer at the Malaysian Agricultural Research and Development Institute (MARDI) in Kuala Lumpur.

Dr Mamat heads an IDRC-funded project that is developing a safer and more efficient knapsack sprayer — one that can be made locally and sold to farmers in Southeast Asia at a reasonable price. Project researchers have reviewed the sprayers currently on the market and identified flaws that contribute to pesticide poisoning. They have also asked farmers to suggest sprayer improvements.

Malaysia has no minimum standards for sprayers, leaving manufacturers free to sell inferior products. Project researchers have consequently found many defects in the sprayers, which expose operators to a variety of health risks.

Narrow knapsack straps, for example, are made of coarse material that sinks into farmers' muscles and bruise skin. If the straps break, the farmer often replaces them with cloth — a material that can absorb leaking pesticides.



Third World farmers are often equipped with poorly designed sprayers that may prove hazardous to their health.

Sharp edges on tanks also pose health risks. They cause wounds that can get contaminated by pesticides.

The tanks, all made of brass, are also too heavy and easily cause operators working in muddy fields to fall and spill chemicals.

Other hazardous features include small tank ports, leaking components, misaligned pumps and air chambers, inadequate strainers, and short lances.

In addition to using defective sprayers, farmers frequently do not take proper precautions when handling pesticides. Researchers tell of farmers mixing chemicals with bare hands and blowing out clogged sprayer nozzles with their mouths.

Farmers rarely wear safety attire because the heavy garments are uncomfortable in the extreme heat. This becomes particularly serious when coupled with poor spraying techniques, such as spraying forward and walking into a mist of pesticide droplets.

The most common symptoms of pesticide poisoning among Malaysian farmers are dizziness and nausea, along with headaches and rashes, says Dr Mamat. More acute reactions include cankers, blisters, skin ulcers, and disfigured hand and toe nails. Farmers who have been severely affected suffer from bronchitis and cancer.

By developing a better sprayer that is still affordable, Dr Mamat hopes to reduce the dangers faced by farmers who rely on pesticides. His team has drafted a preliminary design for a sprayer that incorporates standards outlined by the World Health Organization and modifications suggested by farmers with the best elements of high-quality imported sprayers. The new model will have features such as a plastic tank and a longer lance.

Once a prototype is made, it will be field-tested in Malaysia, the Philippines, and Thailand. After further refinements, a second prototype will be tested and the final blueprints will be made to local manufacturers specifications.

Dr Mamat's plans, however, go beyond blueprints. "Having a good sprayer doesn't mean that it will be used properly," he says. He wants to establish spraying clinics for farmers, increase the wearing of safety attire, and encourage the adoption of minimum standards for the manufacture of sprayers.

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OF MOSQUITOS AND COCONUTS



The small, tranquil ponds that nestle up to villages and towns in developing countries look beautiful

from a distance.

But that tranquillity is often deceiving. Just below the surface of many still ponds can be seen the flicking, squirming bodies of tiny mosquito larvae, the young carriers of one the most debilitating illnesses in the developing world — malaria.

Once hatched into adult mosquitos and blackflies, the female insects prey on humans living nearby. After sucking out blood, they inject fluid infected with malaria into the blood stream that takes up residence in red blood cells.

Malaria victims often do not die from the disease, but they are struck down regularly with high fever that drains their strength and leaves them vulnerable to other illnesses.

In countries like Peru — where more than a third of the country is at high risk to the disease — malaria has devastating effects on the economy. Because of the disease, the workforce suffers high absenteeism, and students suffering from malaria are unable to concentrate, have difficulty studying, and may often miss class because of the illness.

Scientists have developed medications to fight malaria symptoms, but they are usually too expensive for the general population. And mosquitos, being the adaptable creatures they are, have built up resistance to chemicals (insecticides).

Insecticide sprays have been used in the past to wipe out mosquito larvae. But few developing countries can afford commercial insecticides on a large scale. Besides which, many of the sprays have been found to be dangerous to livestock or people who breathe it in or drink water laced with the chemical.

But in Lima, Peru, a research team headed by microbiologist Palmira Ventosilla, has developed an innovative approach to malaria control that is cheap, safe, and grows virtually beside the larvae's breeding ground.

Coconuts

In a study supported by IDRC, researchers at the Alexander von Humboldt Tropical Medicine Institute discovered that coconuts are the perfect incubator for a bacteria that kills mosquito larvae.

"Out in the field, the coconut can replace the petri dish and the lab," Ventosilla explained. Coconut water, Ventosilla said, contains the amino acids and carbohydrates the bacteria must eat to reproduce and the hard coconut shell provides a protective environment for the incubation.

A peruvian researcher has developed a technique that could gain international acceptance in the control of the malaria vector.

In the field, coconuts are used to produce the substance that limits the reproduction of mosquito larvae.

The bacteria *Ventosilla* used in the project — *Bacillus thuringiensis* var *israelensis* H-14 — known as Bti, has been around for a long time. It was discovered almost 20 years ago by Israeli scientists who noticed a large number of mosquito larvae dead in certain ponds. On analysis of the pond water, they isolated the Bti spore.

It is a perfect insecticide because it is deadly to mosquitos and blackflies, but harmless to livestock and humans. During the first three of the larvae's four stages of development, they eat the bacteria along with algae. The Bti then eats away the larvae's stomach lining, killing them.

But, up until now, developing countries have been slow to use the bacteria because of its commercial cost.

Hoping to overcome the financial barrier, the Peruvian research team in 1988 began trying to multiply the Bti spore by fermenting it with various locally grown produce. Because fermentation is a common practice in Peru, the researchers thought it would be relatively easy to teach the technology to villagers, if it worked.

"We studied all different fruits and grains. Bananas, pineapples," said Ventosilla.

Their research soon showed that coconuts were the best option. At room temperature, Bti spores added to coconut water in petri dishes multiplied from 100 spores per ml to a

maximum 100,000,000 spores per ml in 3 days. Doing the same experiment, but injecting the bacteria by pipette into whole coconuts, 100 spores multiplied to a respectable 1,000,000 spores.

Just as Ventosilla was reaching these conclusions, a colleague sent her a research paper from New Zealand that reinforced her results. Written by C.N. Chilcott, the paper discussed the effectiveness of coconut water as a medium for growing Bti spore.

Ventosilla was elated. She knew Chilcott's paper would give her own work credibility.

"It was good for me because other people will believe in the technology," she said.

With IDRC support, Ventosilla and Peruvian entomologist Enrique Perez took the new technology out to two northern communities for field studies — Yurimaguas, in the jungle region, and Huan in the coastal area.

About 37% of the Peruvian population is at high risk to malaria. The problem is at its worst in the northern Amazonian regions and along the northern coastline where swampy rice fields provide mosquito larvae with good breeding grounds.

Peru had the malaria problem almost under control through an active DDT spraying program between 1959 and 1969. The incidence of malaria was reduced nationally to four cases out of 10,000 people. (Malaria is considered



Coconuts are "endemic" in many parts of the Third World.

endemic in a region when one person in 1,000 is infected) But Peru's economy plunged into crisis in the 1970s, and many health programs like the spraying program fell by the wayside. Malaria infection rose again and peaked in 1979, with 20 people out of every 10,000 infected. In 1989, it had settled back to 16 out of 10,000. But in the north of the country, infection rates are much higher.

In field tests around Yurimaguas, Ventosilla's team found that after a single application of Bti-filled coconuts, the bacteria lived up to 18 days. It killed virtually all the mosquito larvae and stopped further larval growth for up to 45 days.

Having proven its effectiveness, Ventosilla now wants to take the technology into a village to see how effectively villagers would use it independently.

The research team has developed a Bti kit that villagers with only minimal instruction can use. It contains a plastic bag full of swabs doused in Bti and cotton plugs. The villager inserts one swab into each coconut through a hole drilled at the top and plugs it with cotton. After the coconuts have fermented 2–3 days, depending on their size and the local temperature, the villager would take the coconuts to a nearby pond, break open the fruit over the water and throw it all in.

A typically sized pond needs 2–3 coconuts for one treatment, said Ventosilla.

Although the technology sounds simple, the biologist said she knows that technology transferred to the village level can fail very easily. She recently applied to IDRC for a second grant to support a 30-month village project to help in the study of the village's socioeconomic dynamics.



Pond sampling in the Amazonian region of Peru.

Coconuts are the perfect incubator for a bacteria that kills mosquito larvae

"The people living in endemic areas know what malaria is and where it comes from," said Ventosilla.

But the project will only work if they train villagers who are interested in participating and take on the responsibility to complete the work, she said.

"Otherwise they say, yes, yes, it's very nice. But 2 or 3 or 4 months later, they've stopped."

The project will never eradicate malaria in Peru.

"It's impossible to control the problem in all the jungle," said Ventosilla. "But you can control your own pond. That's enough."

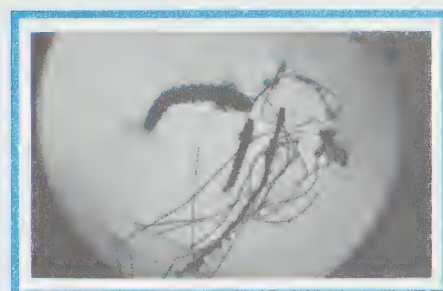
Ventosilla would eventually like to teach the technology to community health workers who could train a wider audience. Peru's health minister has said he would be interested in supporting the project, she said, although resources in the country are very tight.

The magic of the project, is that any country that has coconuts can use it, said Ventosilla.

"And in Peru the coconut is free, because people have a custom when a coconut falls on the ground, they don't use it. Only when it's on the tree," she said. So all the grounded coconuts are fair game, she said.



Top: A coconut is being inoculated with a cotton swab of Bti.



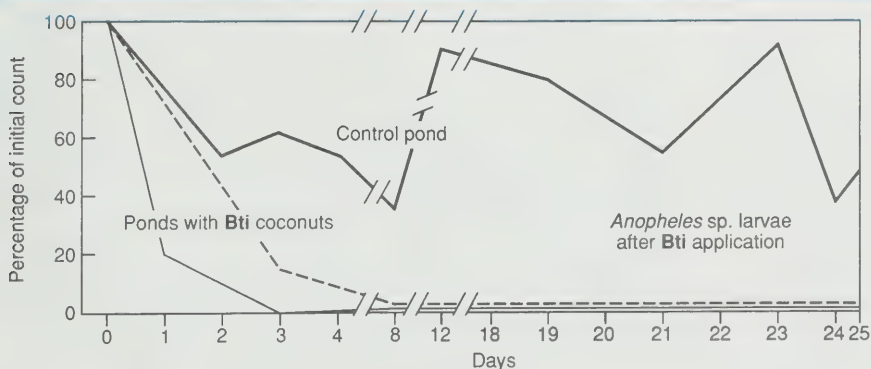
Bottom: The larvae about to be killed.

Ventosilla attended an international conference on tropical diseases in Mexico in 1990 and said she found other researchers very interested in her work. She also learned that innovative malaria research is happening in other Latin American countries. In Brazil, researchers are testing different snails as possible larval predators and, in Colombia, fish are being introduced into ponds for the same purpose.

The researchers also took the first steps toward creating an information-exchange network within Latin America on malaria research.

But as with all projects, it is going to take money, said Ventosilla. And that is in short supply.

Rhoda Metcalfe, a freelance writer based in Ottawa, Canada



Results from Bti tests in various ponds in Peru.



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SEXUALITY: STILL A NEW AREA OF RESEARCH

Sexuality, an integral part of our existence, is a subject that needs more research. Historically, however, sex has not been discussed openly in most societies. Why this reluctance? Perhaps it has something to do with vulnerability, with our hesitance and discomfort in acknowledging a powerful force that is not always guided by rational considerations. Possibly, it is rooted in a fear of acknowledging a vulnerability and, thereby, exposing ourselves to a loss of power. Whatever the underlying reason or reasons, the belief remains common that sexual research is difficult because people are reluctant to discuss sex. In June 1989, a workshop was held at IDRC in Ottawa, Canada, to address this topic.

In recent years, AIDS (acquired immune deficiency syndrome) has provided to be an impetus for research on human sexuality. It was within the context of AIDS research that the Research on Sexual Behaviour Workshop was sponsored and hosted by IDRC.

Because AIDS is primarily a sexually transmitted disease, effective preventive campaigns depend on a thorough understanding of sexual behaviour and its determinants. Although much progress has been made in understanding AIDS, treatments developed to date are costly, not totally effective, and have some serious side effects. The development of vaccines is promising, but it is believed that they will not be widely available for some time, and a cure remains a heartfelt but distant hope. Education continues to be the best means of AIDS prevention and control.

Participants at the Workshop were brought together from diverse professional backgrounds but shared a common interest in AIDS prevention. At the Workshop they set out to explore the status of sexuality research in different regions of the world and to identify cultural differences in sexual attitudes and practices pertaining to AIDS. The methodological, ethical, and practical problems in conducting sexual research were described and lessons from other health campaigns that required changing behaviour were also shared.

Participants challenged the belief that little is known about sexuality because of people's reluctance to discuss sex. They acknowledged that such research can be difficult but emphasized that it has been done, and continues to be done, successfully by skilled, sensitive researchers.

Factors Influencing Sexual Research

The basic underlying criteria for successful sexual research is a sensitivity of and respect for the population to be studied. These are essential whether the methods employed for gathering information are as direct as face-to-face interviews or as indirect as self-administered questionnaires. The educational level of informants (both formal and informal), their gender socialization, age, sex, and marital status are all important considerations. So too, is the society in which they live and its social norms, pressures, taboos, and myths pertaining to sexuality. Workshop participants affirmed the importance of incorporating communities and groups associated with high-risk behaviours into the research process as well as intervention design and implementation.

Methodologies

Workshop participants discussed the advantages and disadvantages of quantitative and qualitative approaches to conducting sexual research. Participants agreed that both approaches are equally important and should be complementary. Each approach must be considered within the context of the kinds of information required. The participants cited condom use as an example. Quantitative approaches can help determine the extent of condom use in a population, whereas qualitative methods can provide a richer understanding of the reasons why people do or do not use condoms.

Religion

Religion is an important factor when sexual research is contemplated. Some religions, or cultures, through their sexual taboos and definitions of morality, will strongly influence the parameters by which persons define their sexuality. Also, some religions exert considerable political power and will influence how open countries are to having sexual research conducted on their populations; for instance, a country that officially opposes birth control might be unreceptive to any attempts at determining the extent of birth control use among its teenage population.

Politics

A country's political agenda will be a major influence on the type of sexual research, if any, that it will tolerate. The need for information that will form the basis for AIDS prevention might well take second place to a government's desire not to offend voters. Research that could confirm a high prevalence of AIDS and other sexually transmitted diseases might be regarded as an economic threat to a country that relies heavily on sexual tourism as an industry.

On the positive side, the threat of AIDS has made sexual research easier. Sexual health provides an acceptable rationale for studying sex, and many governments will permit sexual research within this context. The social and economic challenge that an AIDS epidemic poses is well known. Most governments are anxious to prevent or minimize the impact of AIDS on their populations and will be supportive of efforts aimed at these objectives. Sexuality research is increasingly being seen as essential groundwork for interventions that are designed for AIDS prevention and control.

Sex and Power

One area of concern was the issue of how sex is negotiated and who has power, and to what degree, in sexual relations. In Western societies, a commonly held belief persists that males initiate the various stages of sexual activity from the preliminary stages of casual dating on through to sexual intercourse. The female is not seen as the initiator of relationships. Her role is commonly seen as a passive one in which she either accepts or rejects the male's advances. These beliefs are not upheld by recent studies

that report that it is primarily females who initiate relationships with males through a series of subtle signals. The need here is to complement the skills that indicate sexual interest with the equally important skills of negotiating safer sex.

What are the current constraints to females taking an active role in negotiating sex that is mutually enjoyable but carries minimal risk either for disease or unwanted pregnancy? Although females may indeed indicate interest through subtle cues, a more direct female role is not accepted in many societies. A woman who suggests using condoms may be thought of as being too sexually experienced and aggressive and not a suitable candidate as a long-term partner. Also, she may be interpreted as suggesting that her partner has a disease and raise questions pertaining to the males with whom she has been intimate.

The issues of eroticizing safer sex and promoting condom use were also debated. Some participants felt less than comfortable with the term "safe sex" and asked if sex is ever entirely safe. If the risk of venereal disease and pregnancy is removed, can the possibility of sex as a means of manipulation be as easily eradicated? The beliefs that condoms diminish sexual pleasure and the sense of intimacy were discussed as was how to make condom use attractive and more widely accepted.

Cultural Norms

As in other areas of sexuality, cultural norms are extremely important. Participants learned that in some cultures the belief exists that semen must be deposited in the vagina for sexual intercourse to take place. As a result, some men who have been persuaded to use condoms have obliged while fulfilling their own cultural mandate by cutting the tips off.

Even the vocabulary we use when discussing sexual issues can be fraught with problems of interpretation. This is especially important when targeting specific groups for interventions such as AIDS information, education, and communication campaigns. Apart from the aspect of discrimination, this is part of the reason why such initiatives are now targeted at high-risk "behaviours" rather than at groups. A person who provides sex in exchange for money is probably generally regarded as a prostitute. But what of a woman or man who has a number of sexually intimate friends each of whom provides gifts such as shelter, clothing, or food? Would that person accept being defined as a prostitute and respond to programs aimed at that group?

Another example given of the problem of definition was related to homosexuality. Some men who have sex with other men do not define themselves as being homosexual as long as they are the active partner in the sexual relationship. This, along with bisexuality, would have major implications for an education program targeted specifically at homosexuals. Clearly, the AIDS epidemic has forced us to look more carefully at sexuality and at the issues surrounding it.

The basic underlying criteria for successful sexual research is a sensitivity of and respect for the population to be studied.

Future Research Needs

Workshop participants identified many areas in which sexual research is needed. These included, but were not limited to, such areas as the determinants of sexuality, what motivates people to change sexual behaviour that places them at risk, female sexuality, and the acceptability of condom use. Researchers felt that there is a great need to discover the similarities as well as the differences that exist across cultures. This would have wide applicability and was considered an important research priority. The sharing of information among peers on methodological approaches, design, and measurement was felt to be especially helpful.

Sexual norms are not static but change as the societies in which they are grounded change. At no time in history has this been more evident than now. Advances in travel and communication have made the world a smaller place in which exposure to other beliefs and practices has influenced the rate at which social norms evolve. In many instances a society in which restrictive, procreative sexual norms have become more permissive and pleasure oriented will have guidelines pertaining to responsible sexuality that are grounded in the old norms. Participants at the Workshop felt that sexual research will play an important role in helping societies to adjust to this situation.

Research in human sexuality has important implications for health as well as illness and for individuals as well as for societies. In many cultures sexuality appears to be equated with being sexually active, and sexual activity is equated with sexual intercourse. Such limited perceptions make it difficult to acknowledge anything other than the reproductive aspects of sexuality.

Perhaps we do not truly understand completely what sexuality is or that we are sexual beings throughout our lifetimes and not just during our reproductive years. A better understanding of sexuality will allow us to appreciate more fully that sexuality is an integral part of our personhood and that it is related to intimacy, self-concept, and power as well as pleasure and reproduction.

Pat Trites, Consultant for the IDRC AIDS Committee



A full report of the June 1989 Workshop and the commissioned papers has been published as "Research Perspectives on Human Sexuality: Shifting Focus in a World Facing the Aids Challenge" IDRC-269e. Available through IDRC.

DYEING FOR ECONOMIC GROWTH



Cochineal have been a source of red dye since the time of the Inca.



At first glance, the cochineal looks like any other insect. But this tiny red bug found in prickly pear cacti in the

Andes region of Peru has been an important economic factor for hundreds of years.

The carmine extracted from the insect is a natural colorant that can be used as a dye in food, cosmetics, beverages, and textiles. Before the arrival of Europeans, the Incas had used the insect as a dye source for colourful clothing as well as decorations. By the early 17th Century, Spaniards in Peru had developed a process to extract carminic acid from dried cochineal insects, selling it at great profit to other countries.

Three centuries later, in 1989, Peru exported 31,271 kilograms of carmine and brought US\$12.3 million into the Peruvian economy.

Peru produces 80% of the world's supply of cochineal, but only 40% of this total is actually processed into carmine in the country, and 60% is exported as unprocessed dry insects to countries that extract the carmine.

Small independent farmers are the providers of the raw material for carmine production. These farmers view the insects as a cash crop and sell them to intermediaries for US\$14/kg. The intermediaries then sell the dried cochineal to the extraction plants in

Lima for US\$24/kg where the cochineal is converted into carmine with a 20% yield. The plants process the cochineal at an estimated cost of US\$6/kg and, in turn, export the carmine extract for US\$208/kg.

An estimated 50,000 people are employed in the cultivation and harvesting of cochineal. Their share of the revenues from the cochineal–carmine exports is estimated at less than 10%. This percentage would increase significantly if extraction facilities were to be installed in the cochineal producing areas, as opposed to Lima.

In 1986, IDRC launched a project in Peru to develop a local technology for obtaining a high yield of commercial forms of carmine with a high carminic acid content.

The project began with attempts at increasing the efficiency of carmine production at the laboratory level. Teodoro Goya, a Peruvian chemical engineer with the Institute of Industrial Technology and Technical Standards (ITINTEC) headed the project in Peru, while Dr A.C. Oehlschlager, of Simon Fraser University (SFU), Burnaby, British Columbia, Canada, headed the Canadian counterpart support in this collaborative endeavour.

The results were excellent. "We successfully optimized a carmine-extraction formula at the laboratory scale," explains Goya.

Given these results, IDRC supported a second phase of research — a pilot carmine processing plant at ITINTEC, again with the collaboration of Dr A.C. Oehlschlager. A Peruvian team of engineers led by Goya designed a pilot plant with a production capacity of 5 kilograms of carmine per day.

Early in 1990, the plant began its tests. "We discovered a carmine extracting process that yielded a product with 64% content of carminic acid," Goya says. Before the pilot plant experiments, the industrial processing of dry cochineal insects in Peru had never yielded more than 52% of carminic acid.

After its success at the laboratory and pilot plant levels, ITINTEC is now attempting to transfer the process technology to the private sector. In mid 1990, the Institute offered to all sectors of the cochineal–carmine industry economic analyses and technical advice to build a production plant based on its pilot plant.

Goya says the aim of the project was to establish processing facilities in the rural areas where the cochineal insect is found. "We think it is possible to envision miniprocessing plants outside of Lima operated in collaboration with cooperatives of cochineal producers."

But there have been no takers of this offer. The cost has been one reason. It would amount to about US\$400,000 to start a carmine processing plant, which is within the reach of medium-scale enterprises, but beyond the reach of small-scale companies. Another reason is the predominance of now large-scale producers in carmine processing. These producers had installed, in the mid and late 1980s, six carmine processing plants at a cost of US\$2 million each and are extracting a good-quality product with imported technology.

This, although the ITINTEC/SFU technology is mainly locally developed, cheaper, and produces a better-quality product with a better yield than existing plants, competition in the marketplace has become more

REPORTS



White patches signal the presence of cochineal and can be found in many dry areas of Peru.



Extraction of carmine acid in the ITINTEC lab.

and more intense. The recent change of government in August 1990 in Peru has also contributed to a climate of uncertainty regarding investment of the size required to set up a commercial operation.

Although the timetable for the transfer of the ITINTEC/SFU carmine process technology to a commercial-scale operation may be unclear, one thing is certain: the prospects for natural colorants like carmine appear to be good. Many countries have opened up the door for natural dyes like carmine by introducing severe restrictions on the use of artificial colorants. In the United States, for example, carmine is the only red colorant approved by the Food and Drug Agency for use around the eyes. It is also one of the only colorants permanently listed as a suitable food and drug colorant.

The high quality of orange, red, and blue pigments of carmine have contributed strongly to Peruvian exports. In the first 6 months of 1990, Peru's export of carmine (34,355 kg) was larger than the entire previous year (31,271 kg). Carmine is an increasingly important economic export for Peru. Hopefully, in the near future, with the transfer of the ITINTEC/SFU technology, it will also begin to bring more direct economic benefit to the producers of the cochineal raw material.

Wilson Ruiz, a freelance writer based in Lima, Peru



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FISHING FOR RICE

At first glance, the lush, jade-green rice fields in the Binong Sub-District of West Java, in Indonesia, seem like those of any other in Southeast Asia. But a closer look reveals fish jumping, popping, and lashing about in the wet fields.

Rice-fish farming, the production of fish in flooded fields at the same time as the rice crop, is gaining popularity among Indonesian farmers because of its increased productivity in both rice and fish.

Rice-fish is an integrated farming system with a long history in the region. Asian farmers have been raising fish in the rice fields for 2,000 years, perhaps even longer, providing farm families with an important source of animal protein. Originally, wild fish bred naturally in the rice fields, and were harvested as opportunity provided. Over time, a variety of husbandry techniques evolved in many countries of the region.

But with increased population pressure, the advent of "high-yielding" rice varieties, and the consequent emphasis of governments and researchers on high input rice monoculture, these traditional technologies have often been left behind. In particular, the heavy use of pesticides and herbicides, most of which are toxic to fish, has made fish culture impractical in many rice farming situations. Many farm families have been deprived of this important source of nutrition — one not recognized by research planners in the past.

In the past decade, considerable interest in rice-fish has arisen among researchers and, more important, farmers, as the pressure on farm resources has increased. The need for more efficient and more sustainable farming systems has led to a variety of rice-fish farming systems in almost all countries of the Asian region. Many research institutions and donor agencies are recognizing the importance of this development, and a number of important research activities are underway, in farmers fields and on research stations.

For example, the Sukamandi Research Institute for Food Crops and the Indonesian Research Institute for Freshwater Fisheries are collaborating in an IDRC-sponsored project begun in 1987. The aim of the project is to raise the visibility of rice-fish farming to Indonesian farmers and government policymakers alike. The research has on-station components, attempting to understand ecological and other



Rice-fish farming systems, a more sustainable way to provide food.

interactions of rice-fish systems, and experiments in actual producing farms to understand and adapt to the real constraints and opportunities faced by farmers.

To begin a rice-fish operation, the farmer digs a small pond or trench about 0.5–1 metre deep in a low-lying area of the rice field, to act as a deeper water "refuge" for the fish. The excavated soil is used to raise the

"bunds" or banks of the field to ensure good water control (and in the process creating a raised area above flood level, often suitable for planting other crops like vegetables and fruit trees).

When the field is flooded by irrigation water (or by rains, as in Northeast Thailand) rice is planted as usual. Soon after, however, small fish fingerlings are introduced. In Indonesia, the most frequently used fish are common carp (*Cyprinus carpio*) and other local carps, but tilapia, catfish, and several other species are commonly found in rice-fish farms.

After a short period of up to 3 weeks, during which the rice plants become well established, the fish are let out of the refuge and allowed to forage through the rice fields. At harvest time, or if the fish must be temporarily removed while some potentially toxic chemical is applied to the field, the water is drained down and the fish are collected from the refuge.

This simultaneous culture of fish in rice fields is called "minapadi" in Indonesia, and is the most interesting from a potential productivity point of view. Rotational ("palawidja ikan") and sequential ("ikan penyalang") systems of rice-fish intercropping are also found.

The synergistic effects of rice and fish in the same field exemplify the advantages of an integrated approach to farming. One of the key benefits in this case is that fish recycle nutrients through feeding and depositing their feces in the submerged soil. Initial research results indicate that uptake of important nutrients like phosphorus and nitrogen by the rice plants is significantly improved, in comparison with rice monoculture.

Dr Achmad Fagi, the leader of the Indonesian project, found that "rice-fish culture with common carp actually increased the yields of commonly used rice varieties." Farmers can in many cases get better rice yields plus additional food and cash income in the form of fish.



Fish recycle nutrients and help the rice to grow, they also eat insect pests of the rice.

Fish also aid in rice production by eating insect pests of the rice, such as leaf-hoppers, stem borers, and aphids, plus possibly other invertebrates such as crabs and snail larvae. Although research results are not consistent (because of the complexity of variables in the rice-field environment), the incidence of pests in rice fields generally appears decreased with the introduction of fish.

There are, however, some constraints facing the rice-fish farmer. The availability of good water and fish fingerlings of the right size are two of the most important preconditions for this type of agricultural system.

In areas of rice-fish farming, the uncertainty of rainfall and the limited availability of irrigation water are common problems. According to Dr Fagi these are major constraints on expansion of rice-fish farming in Indonesia. Because rice-fish farming is so dependent on water availability, specific solutions to farmers' problems must be developed before new rice-fish enterprises are begun.

The quality of water is another important issue for Indonesian farmers. Pesticides, herbicides, and, to a lesser degree, chemical fertilizers have created problems, killing fish or at least the organisms on which they

feed. The Indonesian government has recognized this problem and has recently reduced many of the import subsidies on pesticides. Many farmers of course continue to use pesticides.

Timing the introduction of fish fingerlings into the system is critical. Farmers must have access to sufficient numbers of quality fingerlings at the correct juncture in the rice growth cycle. Small local fish hatcheries are only beginning to appear in most rice-fish farming areas. In West Java, there is already a well-developed artisanal hatchery industry, and trade in fingerlings is extensive, but other areas of Indonesia and many other Asian countries have yet to develop this component of the system. This is an important priority for current research and extension programs in those countries, according to IDRC Senior Program Officer Andrew McNaughton.

Rice-fish farming is one of many rice-based farming systems. Accordingly, most of the researchers working in the field in Asia are participants in the Asian Rice-Fish Working Group, part of the Asian Farming Systems Research Network coordinated by the International Rice Research Institute (IRRI). Activities of the Rice-Fish Working Group include

network meetings (proceedings of two recent meetings will be published soon), mutual peer review of research output, and mutual support and technical assistance.

IDRC's contribution to this activity includes direct support of rice-fish research and extension activities in Indonesia, Thailand, and the Philippines, and interim support for the work of the Coordinator of the Rice-Fish Working Group, Dr Catalino de la Cruz, who is based at the International Centre for Living Aquatic Resources Management. Additional support from national governments and from other international donors is currently being sought.

The importance of managing agricultural resources so that their productivity will be sustained into the future, is increasingly recognized by farmers and researchers alike. The environmental benefits of rice-fish systems are clear, even if precise explanation and quantification remain to be achieved. And, as the farmers participating in Dr Fagi's project will tell you, the benefits of the technology to household income and family nutrition are substantial.

Craig Harris, an assistant editor with IDRC Reports



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The Sustainable Agriculture
Newsletter, Vol. 2, March 1990,
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Newsletter, CUSO, 17
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JOINING THE COMPUTER REVOLUTION

Few people at Ofafa Jericho Secondary School know what to make of the machines. Most are mesmerized, seeing them as "those things we see in magazines and on television screens." But at least one person feels quite comfortable around computers.

Hellen Abwavo heads the computer department at Ofafa Jericho Secondary School in Nairobi, Kenya. After 2 years learning computer information systems at the Kenya Technical Teachers College, she was selected by the Aga Khan Foundation for the position at the secondary school.

The Foundation was responsible for the introduction of computers to Kenyan secondary schools through CEPAK (Computers in Education Project in Kenya).

Abwavo is in fact only a small part of the computer revolution in Kenya's secondary schools. The Aga Khan Academy, a private school in Nairobi, embraced the new technology in 1983 when it received five computers and the necessary hardware and software from the Aga Khan Foundation.

After realizing the importance and efficiency of the computer project, the Aga Khan Foundation, with funding help from IDRC, set up a second phase, introducing computers to four public secondary schools in Nairobi. The others selected were Moi High School Kabarak, State House Girls, and Coast Girls Secondary School..

To the teachers in these schools, the projects have been a success.

"My students enjoy the computer classes because of the marvel of using this innovation for the first time," Abwavo says. "I have also noticed that their concentration on their studies has improved by almost 100%." Few teachers would argue with these results.

At Ofafa Jericho, the students and teachers make do with five computers. These machines must be shared among 540 students with 45 students in each class. This leaves the ratio of computers to students in a classroom at 9:1, whereas in the entire school it is 108:1. Computer time is scarce but invaluable.

To alleviate this problem, Abwavo has organized a school schedule allowing each of the 12 classes in the school to have at least one period a week to work with the computers. She thinks this is enough to at least give her students a grasp of computers.

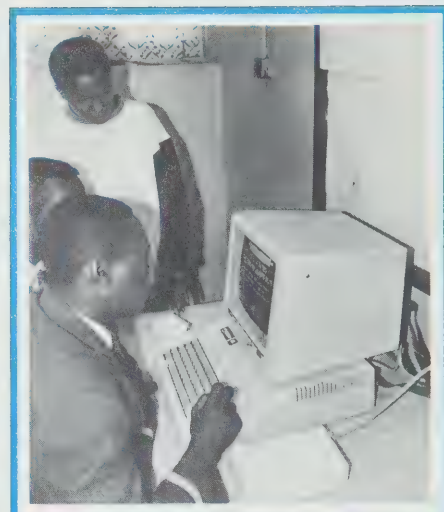
"What we are teaching our students is not computer science as such, but how to use the machine as a learning tool," the department head says.

Indeed, this emphasis on the functional application of computer technology has been the aim of the CEPAK project. For computers to be a successful teaching tool it was decided that teachers should learn tangible skills — the organization of financial accounts, the production of teacher-learning materials, and the ability to show information in the maths and physical sciences that would be difficult to demonstrate in the normal classroom.

Before the introduction of the computers in 1986, Ofafa Jericho had only a chalkboard as a teaching aid. "We now have a teaching aid that can interact with the students," Abwavo says. "Because it can make them discover new things, it has the potential for developing their interests and talents."

This hope for a better learning environment was echoed in a report by the research team of the computer project. They expected computers to "be a stimulation of learning experiences which nurture the growth of creativity, initiative, problem-solving and reasoning skills among both teachers and pupils." The response of the Ofafa Jericho students to the computers seems to indicate initial hesitation but then acceptance. One student at the school says "computers are very frustrating before you know how to use them, but they can be lots of fun later."

Indeed, it seems that when students get over the initial trepidation their enthusiasm is boundless. One teacher at the Coast Girls High School says "our computer room is always in use until 6:45 pm and on Saturdays. I even have to send away some students because the room becomes overcrowded."



Hellen Abwavo, head of the computer department, with students.

Overcrowding and lack of computer time are problems for the secondary schools. Abwavo cites the prohibitive costs of computers as the major stumbling block to the future success of the project.

High import custom duties are charged on the computers because they are listed by the Kenyan government as luxury items.

Abwavo believes that the computers should be exempted from import duty to allow more schools the opportunity to purchase them.

As the director of CEPAK, Salim Versi is responsible for coordinating the computer projects in the various schools. Versi's job entails organizing workshops at the Aga Khan High School, where the CEPAK offices are located, and visiting all the schools in the project to evaluate and train teachers.

He agrees with Abwavo that the future of the project may be bleak unless the government addresses the issue of high customs duty charged on every computer, software, and hardware imported into the country.

"To start with, a school will have to spend up to Sh600,000 (about CAD\$31,000) to get five computers and the necessary software and hardware," Versi says. "This is a very big part of most schools' budgets — they need the money for other administrative needs as well."

Versi sees other problems with the computer project succeeding in the Kenyan school system. Computers, he says, were found to be a source of anxiety among most school staff —



IN BRIEF

almost a "computerphobia." To deal with this, the project must have a core of knowledgeable trainers and educators at both the central and school level.

There must also be a greater understanding of the frustration of novices and the likelihood that some might drop out of the computer course, Versi says. The aim must be to assist teachers and students to become users of the technology with as little pain as possible and in the shortest possible time.

These problems of high prices and frustration, the director contends, are "no excuse not to try and catch up with the world in computer technology."

Other Nairobi schools like Visa, Oshwal, and St Mary's have taken on this task and started similar projects to CEPAK, introducing high-cost computers on their own. Indeed, institutions of higher learning in Kenya have also realized the importance of computers. The four state universities (Nairobi, Kenyatta, Moi, and Egerton) are trying to organize computer departments.

To date, the CEPAK project has had some success. It boasts of having built up a considerable library of more than 500 pieces of software, some 600 computer books, and more than 1000 related magazines.

More important, computer use in Kenyan secondary schools is improving the learning process, increasing the efficiency of teachers, and stimulating the interest of pupils.

Odhiambo Orlale, a journalist based in Nairobi

Techno-Fair at IDRC

In October of 1990, IDRC's Head Office held a technology fair in which several IDRC-funded researchers from developing countries came to display their technological innovations.

Techniques from controlling malaria through natural means in Peru to grain dehulling in parts of Africa were showcased at this 3-day event. In all, 23 different technologies were displayed. Researchers staffed booths and answered questions from NGO representatives allowing an opportunity for research results to be shared and disseminated to the public. More than 50 NGOs attended the fair to learn about the application of research to communities needs in developing countries.

A listing of all the research innovations displayed at the techno-fair and the addresses of the researchers is available from IDRC. The pamphlet is called **"Catalogue of the First IDRC Development Technology Fair, October 1990" and is available from IDRC, Communications Division, PO Box 8500, Ottawa, Ontario, Canada, K1G 3H9.**

Aquaculture

The Institute of Aquaculture of the University of Scotland has recently agreed to set up a major regional fish disease laboratory in Southeast Asia. This Centre, funded by Overseas Development Assistance (ODA) will build upon the nucleus of people and expertise developed by IDRC through smaller projects in Southeast Asia. ODA has decided to put its support behind the work done by the IDRC-sponsored Asian Fish Health Network in this vital industry.

Women and Tropical Disease

IDRC and the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR) are having a competition for the best paper on "Women and Tropical Diseases." The award for the winner is \$5000.

Social and biomedical scientists are invited to review the factors that are the major determinants of infection among women in the following diseases: malaria, schistosomiasis, filariasis, onchocerciasis, African trypanosomiasis, Chagas disease, leishmaniasis, or leprosy. The paper will serve as a foundation for future research in this area by the donor organizations.

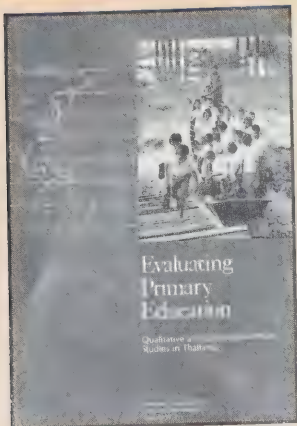
Manuscripts may be in English, French, or Spanish and no longer than 30 typewritten, double-spaced pages, including tables, figures, and references. Papers, or requests for additional information, should be submitted **by 15 August 1991 to: Dr Carol Vlassoff, Secretary, Steering Committee on Social and Economic Research, TDR, World Health Organization, 1211 Geneva 27, Switzerland.**

New Research Centres in Agriculture

The Consultative Group for International Agricultural Research (CGIAR) announced that it will pledge \$10 million more than last year and will encourage greater emphasis on natural-resource management. Four new research institutions joined the network, two of them having received substantial support from IDRC over the years: the Kenya-based International Council for Research in Agroforestry (ICRAF) and the International Network for the Improvement of Banana and Plantain (INIBAP). Other research institutions joining CGIAR are the International Centre for Living Aquatic Resources Management in the Philippines and the International Irrigation Management Institute in Sri Lanka. CGIAR is an informal association of governments, international organizations, and private foundations designed to boost the production of crops and livestock in developing countries through research.



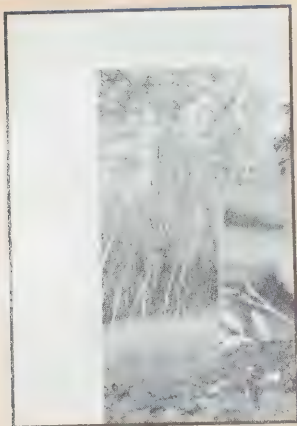
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"Evaluating Primary Education" by Amrung Chantavanich, Supang Chantavanich, and Gerald Fry
IDRC-261e

Primary education provides a fundamental base for all further schooling, training, and self-education. In Thailand, the quality and efficiency of primary schooling is currently a major issue in education policy. This book analyzes and measures, both quantitatively and qualitatively, the many issues related to primary education in Thailand.

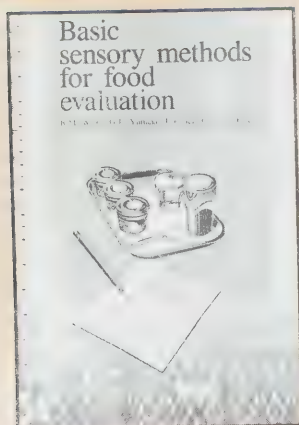
Published by the International Development Research Centre (IDRC) in Ottawa, Canada



"Leucaena Psyllid: Problems and Management" by Banpot Napompeth and Kenneth MacDicken (editors)

The leucaena psyllid insect has been a serious pest of the multipurpose tree species, *Leucaena leucocephala* in several countries since 1984. This book updates and disseminates information on the psyllid and psyllid research.

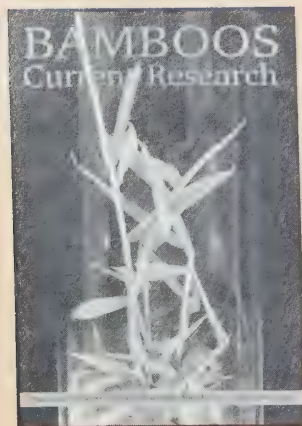
Published by Funny Publishing Ltd Partnership, 549/1 Soi Senanikom, 1 Phaholyothin, 32 Bangkok, Thailand



"Basic Sensory Methods for Food Evaluation" by B.M. Watts, G.L. Ylimaki, L.E. Jeffery, and L.G. Elias
IDRC-277e

This book provides a basic technical guide to methods of sensory evaluation. The sensory evaluation testing focused on black beans and addressed such problems as storage hardening, length of preparation time, and nutritional availability. It has been compiled particularly with the needs of scientists in developing countries in mind.

Published by the International Development Research Centre (IDRC) in Ottawa, Canada



"Bamboos: Current Research" by I.V. Ramanuja Rao, R. Gnanabaran, and Cherla B. Sastry (editors)

This study is a condensed version of the Proceedings of the International Bamboo Workshop in Cochin, India. Bamboo remains a vastly underresearched subject of forestry in developing countries. This collection of papers by specialists in bamboo is an attempt to understand this resource better and suggest measures for its proper utilization, management, and conservation.

Published jointly by the Kerala Forest Research Institute in Peechi, India, and the International Development Research Centre (IDRC) in Ottawa, Canada

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REPORTS

VOLUME 19, NUMBER 2, JULY 1991



Tomorrow's Catch



P O B O X 8 5 0 0

"On pages 20 and 21 (*Reports*, Vol. 18, No. 4), there is information on Rainwater Harvesting from Rooftops in the Philippines. I am happy to write to you that the Consortium has also been engaged in a similar programme. A government funding organisation known as the Council for Advancement of People's Action & Rural Technology (CAPART) in India provided us financial support for experimentation and demonstration of 40 reservoir tanks of 3000 lts capacity each in the Himalayas lying in the State Uttar Pradesh in India. These tanks have been made by using ferrocement technology. They have also been provided with a filter at the top to make water potable. The filter consists of local biomass, small stones, sand and coal.



Based on this programme, the local voluntary organisations further got support from CAPART for constructing about 162 such reservoirs.

We have also been receiving requests for transfer of this technology from other states in India. A photograph showing the completed tank and the beneficiaries is attached."

Y.K. Sharma, Consortium on Rural Technology, New Delhi, India.

"I was extremely delighted to learn about the revival of *IDRC Reports*. The *IDRC Reports* in its new avatar is both informative and enlightening carrying as it does features and articles on the problems facing the Third World. Please keep up your good work."

Radhakrishna Rao, Bangalore.

"I read...Sustainable Development in the October 1990 *Reports* with great interest. I do, however, disagree on one point....You seem to exclude micro considerations and consider sustainability to be only a macro problem. We agree that sustainability requires both micro and macro requirements to be met. For example, prairie agriculture will not be sustainable if only the macro requirements are in place — individual units (farmers, suppliers, processors etc.) must also have incentives. We believe this example can be generalized. I think you (Dr Brooks) recognize it as well when you state 'sustainable development as a set of criteria into both project analyses and reviews of wider policy changes.'"

R.M.A. Loyns, Dept of Agricultural Economics and Farm Management, University of Manitoba, Canada.

"The new *Reports* is really very much in a new get-up and informative....I would further appreciate if views on food borne parasitic diseases and their public health significance may at times appear to educate the people at the grass root level."

P.D. Juyal, Punjab Agricultural University, India.

"As a community development officer and concurrent information officer of the Department of Local Government (DLG) in one of the towns in the province of Capiz, Philippines, I've got a lot of ideas learned from the *IDRC Reports*....from experiences of other people from other nations, how they come up with programs and activities that would help improve their everyday life through self-reliance and resourcefulness."

Bienvenido P. Cortes, Roxas City, the Philippines.

The magazine welcomes letters from its readers. Because of space limitations, letters may be edited or published only in part. Please write to IDRC Reports, PO Box 8500, Ottawa, Canada, K1G 3H9.

REPORTS

IDRC Reports is published quarterly by the International Development Research Centre (IDRC) of Canada. Its aim is to keep an international readership informed about the work IDRC supports in developing countries as well as other development issues of interest. The magazine is also available in French as *Le CRDI Explore* and in Spanish as *El CIID Informa*.

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REPORTS

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Artisanal fishing communities in Latin America, as elsewhere in the world, face the uncertainty of an industry that suffers increasingly from the effects of pollution, market pressures, competition, and the depletion of natural resources. In this issue we look at the innovative ways fishing communities are working together to protect and plan the future path of development in this industry. Their way of life threatened, these communities must adapt and seek new ways of ensuring tomorrow's catch today.

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FROM HUNTERS OF WILD RESOURCES TO CULTIVATORS OF THE SEA



The future of artisanal fisheries depends on the success of efforts to replace declining capture fisheries with extensive mariculture — a system based on sustainable development rather than uncontrolled resource exploitation.



Artisanal fisheries communities in Latin America are facing an important challenge as

coastal resources become depleted, the natural environment shows the impact of pollution, and the quality of life decreases in coastal areas.

The need to maintain the present level of sea food production, now soaring to a global maximum of 100 million tonnes (of which Latin America provides more than 15%), requires urgent action from both governments and fishing communities alike.

The intention expressed by national fisheries authorities in a meeting of the Regional Commission for the South Pacific (CPPS) to increase the current rate of local consumption of marine food from 5 to 15 kg per capita yearly without decreasing the current level of exports (13 million tonnes) will require an estimated increase of 30% of total production toward the year 2000. This means significant increases

in production for countries like Chile, Colombia, Ecuador, and Peru. It will require a tremendous effort to replace declining capture fisheries with extensive mariculture — a system of fishing and seafood extraction based on sustainable development rather than uncontrolled resource exploitation. Planners will also have to implement an efficient administration and management system of coastal zones and existing natural resources.

Such a program requires the active involvement of the almost 2 million fishermen inhabiting the 22,000 km of coastline along the continent. What are the chances of this happening and what are the problems and limitations?

Artisanal, small-scale fisheries provide more than 90% of the seafood consumed by the local population and a good percentage of the high-quality export commodities. Because of their

experience in the use of the tools and of the marine environment, artisanal fishermen are in the best position to implement an intensive program of coastal mariculture.

But for the fisherman to turn from a hunter of wild resources into a cultivator of the sea, a number of things are necessary: organization, training, technical support, a comprehensive view of the role of resource management, knowledge of appropriate technology, and recognition of the role of the community in the development process.

Artisanal fisheries represent more than 40% in value of the overall fisheries production of the continent, and if the artisanal fishermen are seen as suppliers of raw material for the fishing industry, their role becomes even more important in the local

economy. In spite of this, the status of the artisanal fisherman in the continent is rather depressed, with low levels of education and training, and marginal access to the market.

In Colombia, coastal communities are facing problems of degradation of the environment in the marshlands and estuarine regions where road construction and extensive mangrove destruction by the shrimp farms has depleted traditional resources.

In Brazil, fishermen need to diversify to compete with the industrial tuna fishing and are badly in need of technical and institutional support.

In Peru, fishing communities lack organization and specialized training to cope with new technologies.

In Chile, where the organizational level is better, the National Fishermen's Association is demanding better access to the market. It is also asking for appropriate fishing laws that will ensure the development of small-scale fishing communities.

All over the continent fishermen are becoming aware that as resources become scarcer, there is an increased chance of conflict between artisanal and large-scale, industrial fishing. Furthermore, the competition for open access to resources is turning into a struggle for obtaining restricted legal access to the environment, particularly in the coastal zones, which show better potential for the establishment of mariculture systems.

IDRC's Strategy

IDRC, through its Fisheries Program for Latin America, has been promoting an integrated approach to the problems of artisanal fisheries. Regional meetings have been held with the participation of research institutions, governments, and NGOs. Fishermen's organizations have also participated to discuss and evaluate priorities and alternatives that would represent an interdisciplinary model of small-scale development.

As a result of these early actions, a different type of project emerged by the mid 80s where the bioecological aspects of resource management, the methodological elements of



In Latin America, many fishing communities lack organization and specialized training needed to cope with new technologies.

technology generation and transfer, and the socioeconomic and cultural aspects of community development were addressed through a participatory planning scheme.

Such a model has been called Integrated Coastal Development (ICD) because it proposes a multidisciplinary approach to the development of coastal communities. The model recognizes three integral elements in the development process.

- The Community with people as its central theme; their social needs, economic conditions (access to markets), and cultural environment. This is the field of social and economic scientists.
- Natural Resources and the Environment; here the research problems refer to the maintenance and recovery of the fisheries resources and of the marine environment. It is the field of biologists, ecologists, and oceanographers.
- Technology; the problems refer here to the generation of appropriate technology for the proper use of the marine environment by people (for capture, processing, and cultivating technology). This is the field of fisheries technologists and engineers.

The three fields are interconnected with many combined areas of interest and responsibility. There is, for example, a link between natural resources and technology in terms of the use of nondestructive fishing gears and the control of pollution. There are also overlaps between the technological and the community development field (in the methodology for technological transfer and training of fishermen) and between the community and natural resources field (in the problem of allocation of fishing rights and access to the resource and management of coastal zones).

The application of this ICD model was clearly evident in the creation of artisanal fisheries projects in Chile, Colombia, Brazil, and Peru. A regional network system was also put in place to coordinate and improve the transfer of information between these projects.

The advances achieved by the research projects were evaluated in a 1989 regional seminar in Chile. A key recommendation of the seminar was the need to keep the channels of communications among researchers, fishermen, and national authorities open. Toward this goal, national ICD committees were formed in Brazil, Chile, and Peru.

The tasks of the committees are varied. They review the advances reported by the research projects, evaluate the latest developments in the situation of the artisanal fisheries, and



The Integrated Coastal Development model recognizes three integral elements in the development process: the community, natural resources and the environment, and technology.

contribute to the national organization of the artisanal fisherman. Most important, perhaps, they point out the problems and priorities perceived by researchers and fishermen.

The role of these committees is essential in a coordinated development plan for the artisanal fisheries. The Peruvian ICD committee is actually chaired by a fisherman, Mr Angulo, who is also one of the leaders of the recently established National Fishermen's Association of Peru, CONAPAR.

The ICD program in Latin America is an ongoing process, constantly enriched by the interaction between fishermen and researchers. It also promotes the lateral exchange of information, making it easier for community leaders to attend meetings organized in different countries. More than 15 fishermen from Brazil, Colombia, Peru, and Uruguay have participated in fishermen-organized seminars in Chile between 1987 and 1990.

Latin American fishermen are discovering their new role in cultivating and maintaining the marine environment much like small-scale farmers are learning to cultivate their land in agriculture systems. The ICD process also represents a challenge for all marine scientists who must learn how to integrate their different

disciplines into an ecological view of the marine production process to develop a rational model for using the sea and its resources to feed future generations.

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Their lives are mirrored by their bronzed and prematurely lined faces, weathered by the combination of toil, wind, and sea, which leave a mark that neither time nor the promise of future prosperity can erase.

These are Chile's artisanal fishermen who start working at the age of 8 "to help their parents" continue their difficult — yet hard to relinquish — trade. "Our love for the sea is very strong," said Hugo Arancibia, president of the regional federation of artisanal fishermen of Chile's Eighth Region, one of the country's three most important fishing zones.

The fishermen are fighting so that their children do not follow in their footsteps, but economic problems, worsened by precarious social welfare and health systems and the almost complete lack of education for their children, make this wish a dream that very few can achieve.

With its 4200 kilometre-long coastline on the Pacific, Chile is now one of the world's five major fishing countries with an annual catch of more than 5 million tonnes, of which 400,000 is caught by artisanal fishermen.

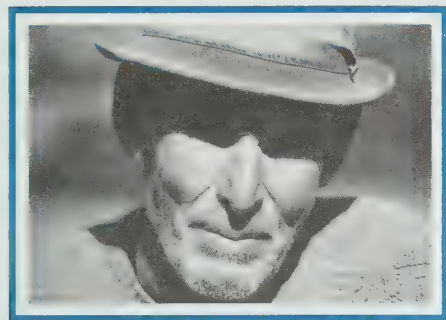
Although the artisanal fishermen, now 53,000 strong, contribute only 6.7% of the country's total catch, the foreign exchange they bring in represents a very important contribution to the country's economy.

Of the \$840 million generated by the fishing sector in 1988, 40% — or \$336 million — was accounted for by the artisanal sector.

A Strenuous Life

There are 189 fishing coves in Chile, 70% located in rural areas and the remainder in or near urban areas. According to Hugo Arancibia, three groups of people work in it. Fishermen, the largest group, make up 45% of the total; shellfish fishermen account for 27%; and seaweed gatherers represent 20% and the significant growth of this group in recent years is because of the export of seaweed.

THE STRUGGLE TO HARVEST FOOD FROM THE SEA



The tradition continues but with a new face to the future.

Near Talcahuano, the country's largest fishing port, is the fishing cove of Perone. Its 60 inhabitants are all very poor but display a great deal of enthusiasm for their work. Of these 60 people, 40 are involved in gathering seaweed and shellfish and in deep-sea fishing. Perone has the most serious economic problems of the seven fishing coves in the Eighth Region, but its residents — the majority of whom are women — have embarked upon a fight against poverty.

"Production is the women's responsibility," said Exequiel Lara, president of the union, who thinks of nothing but getting his people out of their current plight.

There are 10 boats in Caleta Perone used only by the men for off-shore fishing. The women do the rest. "By five o'clock in the morning we are already on the beach," explained our contacts, Ramona Lara, María Elena Ibáñez, Rosa Chamorro, and Laura Ibáñez, four of the many women residents whose lives consist solely of work, household chores, and going down to the shore four or five times a day to look for the sought-after seaweed they call "luga." From this seaweed comes agar, a highly prized extract used as a thickening agent and sweetener in food, cosmetics, and pharmaceutical industries all over the world.

One kilogram of seaweed sells for \$2 and the 100 grams of agar obtained from it provides a return to the country of 50 times that. The amount each inhabitant of the village earns in a month to live on is between \$100 and \$150.

The Fishing Cove of Tubul

There are fishing coves with few resources where the inhabitants have very modest aspirations, such as one day being able to sell their products in a supermarket rather than, as at present, in street markets. There are others, however, like the fishing cove of Tubul that are highly organized.

The example of unity, effort, and a change in mentality set by the residents of the fishing cove of Tubul was generated by them and their tenacity and desire to move ahead.

Tubul is a rural fishing village of 1500 inhabitants, 640 of whom are involved in gathering the Gracilaria seaweed, which the fishermen call "pelillo." The remainder of their time is spent fishing or gathering shellfish in the rich Gulf of Arauco.

According to José Valenzuela, president of the Río Tubul union, they maintain a system of economic solidarity. All resources obtained from there go into a common fund, and the earnings are divided into equal parts for all associates over the age of 18.

The profits exceed \$2 million a year from the sale of seaweed and \$1 million from the sale of other commodities. Monthly per capita income in the village is \$200–300. In the average family household, this

amount may be three times that, if you combine the salaries of the husband, wife, and children over 18 who are members of the union or the trade association. If the children are studying and not working, they receive a grant worth half a salary to enable them to finish school.

"The fishermen do not allow their work to be regulated," said José Valenzuela, "but in Tubul we are implementing a management plan which we adopted for its practicality."

Half of the 640 people who fish for a living in Tubul are women. "They work much harder than we do," said Valenzuela. "The truth of this has prevailed and been recognized little by little." In addition to their work in the home, they are responsible for cleaning and baiting the fishing lines, laying on provisions, cleaning the boats, and, as if this were not enough, gathering seaweed.

This organization has enabled the residents of the fishing cove to achieve a series of improvements not easy to obtain for the rest of the artisanal fishermen. Good houses, household electrical appliances, vehicles, better



In Chile, the livelihood of nearly 300,000 people depends on what they harvest from the sea.



Among the many problems confronting the sector are those related to health, education, social security, and, of course, marketing the produce.

work tools, motorboats, and, more important, the installation of drinking water for the fishing cove, an investment that costs more than 25 million pesos (\$76,000).

The project for the immediate future is to build a school for adults, because education is one of the few problems that it has not been possible to solve.

Concerns and Aspirations

The research studies done at Chile's Pontificia Universidad Católica and financed by IDRC on artisanal fisheries, technology transfer, creation of fish farms, and aquaculture operations, among others, brought us into close contact with this sector of the population. Analysis by sociologists and economists of this case study served to reveal a great deal about their lives, concerns, and aspirations.

Even if the adults like their trade, they do not want their children to follow in their footsteps because they consider this would involve great sacrifices and a life that is neither stable nor secure. "So much so," said Susana Lillo, daughter and niece of fishermen from Caleta Rocuant, "that my husband currently works as a

chauffeur." Pollution caused by local industry has led to a gradual decline in natural resources. A few years ago you could catch up to a thousand razor clams a day, whereas now the catch is no more than 200 or 300.

To help out at home, Susana works as a domestic in other people's houses because she does not want her children to go without an education. "I do not want what happened to me to happen to them," she said. "Their marks are excellent and I will fight to ensure that they continue their studies."

The Major Problems

Among the many problems confronting the sector are those related to health, education, social security, and, of course, marketing their products. Fishermen would like to sell their catch directly to the consumer, but there are many impediments. Most fishermen sell through intermediaries they call *remitentes* (remittance men) in their slang. Because the "raw material" remains fresh only a short time, and there is no adequate infrastructure to

enable fishermen to store their merchandise, they must sell it in a form that will sell quickly and usually at prices that are not very advantageous to them.

According to the conclusions drawn in November 1989 by the industry during the most recent National Congress organized by the Confederación Nacional de Pescadores Artesanales de Chile, CONPACH (National Confederation of Artisanal Fishermen of Chile), the major marketing problems are "the inequality in terms of bargaining power between fishermen and those who market the fish, the near monopoly of some of them to set prices arbitrarily, the lack of organization and training in the fishing industry, and, of course, the lack of an adequate infrastructure for cold storage and an improved transportation system for their products."

Although the fishermen prefer to work alone, it has been proven that joining forces to sell their catch offers them improved economic well being.

The organization, built up by a large body of fishermen, will undoubtedly bring real development. The 111 unions that bring them together and recent government support policies will mean that this sector will achieve its longed for social, economic, and cultural well being.

Considerable support is available through the projects currently financed by IDRC in Chile's universities. They are designed to promote the overall development of the fishermen and their families, improving not only their work but their lot in life as well. This will enable the country not only to surpass its economic expectations of the fishery industry but also to improve living conditions for the nearly 300,000 people whose livelihoods depend on what they harvest from the sea.

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ONE STEP FORWARD FOR ARTISANAL FISHERIES



Valparaíso in the Pacific Ocean — its old houses perched precariously on the hillsides and the hundreds of

small, brightly coloured fishing boats drawn up on its sandy beaches are part of this Chilean port's charm.

One of the most bustling areas of Valparaíso is Caleta Portales, an enclave of artisanal fishermen whose 250 members, together with their families and service workers, belong to a union that celebrated its 50th anniversary in 1990. Altogether there are more than 650 people directly involved in the activities of this fishing cove, which netted a catch of 250 tonnes of fish and sales worth more than one million dollars in 1990.

Three years ago in Caleta Portales a project was begun to process sea products to stimulate people's consumption of fish, encourage fuller use of existing manpower and resources, and take over part of the distribution process. The project was intended to provide an alternative to improve the living conditions of artisanal fishermen.

Conapac's (Confederación Nacional de Pescadores Artesanales de Chile) (National Confederation of Artisanal Fishermen of Chile) initiative, with the support of IDRC's Integrated Coastal Development program, made it possible to establish a production centre for which the pilot project has now been completed — with optimal results.

The project was divided into three phases and was undertaken by Cedipac, a company formed by Conapac to promote the technical and organizational development of artisanal fisheries. The first phase consisted of researching the conditions for the project's development offered by the fishing coves and determined that Caleta Portales had the highest potential for success because of the nature of its organization and market.

The second phase consisted of a pilot centre for which Caleta Portales' union supplied the premises on which a small business could turn out an inexpensive product using a simple process: pieces of dried, salted fish sold under the name of "fish fillets."

The women of the village, fishermen's wives and baitworkers, were an important driving force behind this project and took charge of processing and promoting the product, for which they received a year's training in the form of classes given by Valparaíso's Universidad Católica.

This phase of the plan also contained a strong market research component, explained Waldo Bustamante, an economist and marketing specialist who served as a consultant for launching this initiative.

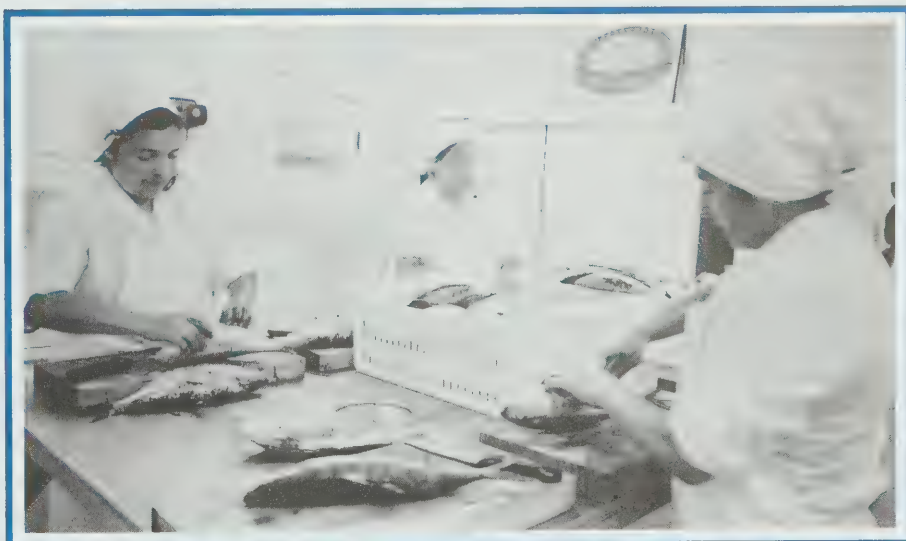
In group sessions with sectors of Santiago and Valparaíso's population, in which the women of Caleta Portales played an active role, it was learned that, contrary to widely held assumptions, it was not enough for the product to have good flavour and a competitive price: any product aimed at the working classes also had to be packaged in a sophisticated manner with colour, packaging, and labelling that met certain criteria.

The project was not without its obstacles, among them the inadequate technical equipment with which it began. The machine provided by IDRC was inappropriate for the fish species caught by the villagers and the project is currently operating with a machine obtained on loan for a few

months. Another pitfall was encountered when it was discovered that neither saurel nor sardines, two of the least expensive and most abundant types of fish available, could be used to produce dried fillets because their high oil content, when the fish were exposed to the air, darkened the flesh and put off consumers. Hake and other varieties were eventually chosen as the basis for developing the product.

A related weakness was the initial lack of confidence of many fishermen in a project managed by a woman. Their resistance gradually evaporated, according to Patricia Carrasco, the fisheries engineer in charge of the Production Centre.

The marketing strategy employed made it possible to determine that the Production Centre had an ensured institutional market through social agencies — old-age homes, soup kitchens, child-care centres — which currently buy one tonne of fish fillets processed by the plant. Studies and experience also indicated that the Centre should diversify its production to include such other alternatives as frozen fish fillets, fish nuggets, and marinated herring, which have a guaranteed market in restaurants and supermarkets and are more profitable because of their higher level of processing.



The women of Caleta Portales, fishermen's wives and baitworkers, are an important driving force behind the project to process sea products and stimulate consumption of fish.

The limitations in terms of plant and equipment at present inhibit the potential for diversifying production: a spacious building, machines, and a cold-storage room would be required to market a diversified range of products. Conapac and the Centre's management are now working on meeting these requirements, said Humberto Chamorro, president of the confederation and of the Caleta Portales union.

The third phase of the program has thus been reached, in which the project becomes a business.

Hernán Ramírez, business advisor for Cedipac, pointed out that during this new phase work was being done to strengthen the organization. "In order to move from the project stage to the business we have now built, we must introduce organized administrative, supply, production, sales and distribution systems."

Fisheries Underdevelopment

Chile is the world's third largest producer of fish. In 1990, its exports reached 1.4 million tonnes and generated foreign exchange worth US\$942 million, according to recent statistics released by the fisheries department of the Economics Ministry.

Despite this and Chile's more than 2000 kilometres of coastline, domestic consumption of fish is very low and its share of the national diet has also declined over the last 5 years. A variety of factors — cultural, economic, health, and market related — explain the population's lack of interest in a product that is readily available, according to Luis Morales, sociologist and project leader. More than 90% of fish production is used to make fishmeal, a basic ingredient of animal feed.

In Chile, as in other Third World countries, artisanal fishermen have low standards of living, education, access to health services, and social security.

Nevertheless, the unions in the fisheries sector understand the inherent potential and the importance to the rest of the population and, usually, for the country's economy, that better use is made of sea products.

The completion of the phases of the Caleta Portales Production Centre project has enabled artisanal fishermen under the Conapac umbrella to prove that this is a viable objective, one in which they display pride and commitment.

Humberto Chamorro commented that, "our dream is to expand the plant, process the fish further, industrialize our product, meet the requirements of the marketplace and also to begin to export. We can see that there is considerable potential for artisanal fisheries because the domestic fishing industry remains underdeveloped, evidenced by the fact that the largest share of its catch is used to make fishmeal and the product is of no further added value. We propose to add value to our work, increasing staff and the level of technology used to catch fish, so as to increase consumption and thereby contribute to raising national living standards, and also to stimulate the development of a sector of economic activity which has not hitherto been profitable."



Chile is the world's third largest producer of fish. In 1990, its exports reached 1.4 million tonnes.

Having reached this initial objective, the fishermen of Caleta Portales are setting themselves new challenges. They would also like to produce flour from seaweed, aquaculture, and silage, etc., now that the Production Centre has opened the door for them to a high level of creativity. The remaining fishing coves and unions affiliated with Conapac are following this project very closely and are also displaying interest in setting up their own production centres.

Waldo Bustamante agrees that the project has demonstrated that it has successful aspects, pointing out that there is a real possibility of building "a second storey" for artisanal fisheries through industrialization. The fundamental limitation, he said, is technological, the lack of machinery, but this obstacle could be overcome. "The central problem for any project is that of the marketplace, and that has already been overcome."

The project may serve as a model for other fishing coves, said Bustamante. The interest of the artisanal fishermen and their support are fundamental requirements for achieving the goal and these are assured.

Richard Vera is a Chilean journalist for the Santiago newspaper "La Epoca"



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FISHING COMMUNITIES MARKETING THE SEA



In the environs of the Colombian city of Santa Marta, along the coast bathed by the Caribbean sea, some 3000 artisanal fishermen live in precarious conditions.

To improve the living conditions of these hard working toilers of the sea and to utilize the potential of artisanal fisheries to supply the domestic market, IDRC has joined forces with the Instituto Nacional de los Recursos Renovables y del Ambiente [National Institute for Renewable Resources and the Environment] (INDERENA) of Colombia to launch the Integrated Project for Research and Development in Artisanal Sea Fisheries.

New Approach to Fisheries

The project has, among others, the goal of determining the abundance and seasonal patterns of fisheries in the 21 communities selected, introducing suitable management and harvesting methodologies. To this effect, a study is being conducted among fishermen to gather information about the number and types of fishing tackle, the crafts used, and fishing areas and seasons for each species. Also, information has been obtained on the volume and geographical location of fisheries, economic characteristics of fishing units, number of persons, etc. All this has led to the implementation, for the first time in Colombia, of a statistical system on artisanal fishing that could serve as a model for other areas of the country. Work is in progress to prepare a map of the existing hydrobiologic resources that, together with other information, will be distributed among all the fishing communities to help them make better use of available resources.

Fishermen and Researchers Put to Sea Together

"I have been fishing for many years, and I don't think you can teach me anything new" is the typical initial attitude among fishermen when technicians try to introduce new fishing methods or technologies. This initial resistance, however, has been subsiding since researchers have begun to join fishermen in fishing

activities to evaluate traditional fishing tackle and introduce modifications. One of the improvements tested is the "raised nets" fishing system, which consists of using gasoline lamps to attract fish. Tests were also conducted with shark boulders (lines containing between 20 and 1000 fishhooks), the efficiency of which could be improved once the demand for new species increases.

Women and Fisheries

The project's most positive aspect has been the participation of women in fishing activities. Women in Pueblo Viejo, Taganga, and Rosario Island have attended courses on fish processing and preservation and have learned how to salt and smoke fish to make it last longer. These courses have taught them not only how to detect when fish has spoiled, but also how to prepare a more varied menu for their homes, which now includes sausages, fishburgers, pasta, croquettes, and patties — all made with fish.

Particularly useful for the smoking process learned by the women was the "wet pile" method, which consists of salting fish in its own liquid. Good results were also obtained using a mixture of ice and salt in a container or *cava*.

Family Microenterprises

The improvement and introduction of new preservation and processing techniques have given women the motivation they needed to create two small enterprises for the processing

and marketing of fish products. To quote a woman in Pueblo Viejo: "After having learned to process various fish products, we decided it was more profitable to market processed products rather than fresh fish." In groups of three or four, women prepared several samples that they took to artisanal fairs, and were met with resounding success.

Unfortunately, despite their success and wide demand, these small enterprises lack the necessary equipment or the structure to attain large-scale sales. To solve this problem, the project's multidisciplinary group has been providing advice to the members of these fledgling enterprises on organizational, managerial, and technical matters as well as on other aspects, such as procuring the necessary health licenses and credit. Marketing and price studies are also being conducted to give these enterprises a competitive edge. It is to be expected that, when these strategies and activities begin to bear fruit, artisanal fishing will provide the people of the region not only with more appetizing dishes but also with a more promising future.

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Fishing communities must make better use of available resources.

SATELLITE CATCH



Soon,, these tuna will be caught using modern technology.



Like a lookout locating schools of fish from his perch in the crow's nest, the orbiting NOAA-H satellite provides fishing information that is essential to the small communities on the coast of Chile.

In Valparaíso, one of Chile's major ports, and Quintay, a village some 60 km to the south, the crews of small fishing vessels regularly receive maps showing the surface temperatures in the sea. This information, provided through the SATAL project run by the Catholic University of Valparaíso's School of Oceanography, is viewed as crucial by the fishing communities that use it to improve the financial return on their operations.

The surface temperature of the sea is acknowledged as a key factor in the presence of albacore, or white tuna (*Thunnus alalunga*) and swordfish (*Xiphias gladius*) both of which appear to have a particular fondness for the thermal fronts caused by upwellings of cold water. Local fishermen are very familiar with this

predilection. They normally take thermometers with them on the boats, towing them astern until they find areas that are most conducive to the presence of tuna or swordfish.

The sweeping of vast expanses of sea demands heavy expenditures of time and operating costs, especially for fuel, which accounts for close to half of the fixed costs. Satellite maps have enabled almost half the artisanal fishermen to identify the albacore and swordfish fishing grounds more easily and thus increase their catch. A 1989 survey of users of the SATAL maps showed that 84% of fishermen were particularly appreciative of the reduced amount of time and fuel required to search for fish. Maria Angela Barbieri, director of the IDRC-funded SATAL project, explains that the maps provide a welcome solution to the problems of the fishermen, who could sometimes spend days crisscrossing the ocean in search of waters rich in albacore or swordfish.

The NOAA-H satellite passes over Chile at a height of 800 km on its polar orbit. Its radiometer records the surface temperatures (provided the weather is not cloudy) and retransmits the information to the parabolic antenna at the University of Chile's Space Research Centre (CEE), located in a Santiago suburb. From there the radiometric information is relayed to the Catholic University of Valparaíso over telephone lines. Two hours after the satellite has flown over the Chilean coastline, the first map is in the hands of the School of Oceanography. As Maria Angela Barbieri stresses, however, the work is only just beginning at this point. The maps need to be interpreted and transposed into a simple, readily accessible form that can be easily read by the fishermen in the communities served by the project. "In addition," she adds, "we have to deliver the goods quickly. The surface temperatures of the sea and the thermal fronts are constantly changing position."

Satellite images received by 3:00 pm can generally be consulted the same evening in the communities located close to Valparaíso. Land communications are, however, an ever-present problem in a country such as Chile. A village like Quintay has only one bus a day and no telephone service. The SATAL project maps also sometimes miss the bus and are not delivered until the following day.

"A dozen fishing communities, such as Papudo, Quintay, Quintero, and El Quisco are involved in the project. All in all, there are a total of about 180 boats, with more than 600 participating artisanal fishermen. Our objective is now to make the maps available in the more remote villages."

One of the most visible effects of the use of satellite maps by Chilean fishing communities has been the steady migration of fishing grounds. Since the maps were introduced, the artisanal fishermen, who previously rarely ventured far from Valparaíso, have ranged ever farther offshore and extended their fishing grounds considerably, both northward and southward, from the twentieth to the

fortieth parallel. Similarly, the fishing season for these species, which used to run from February to June, now extends until October. Finally, the artisanal fishermen's swordfish catch has increased considerably from 103 tonnes in 1984 to 4741 tonnes in 1989. Although the increase in the number of vessels and the improvement in fishing gear is responsible for the lion's share of this sharp rise, the satellite maps have also been instrumental. It is worth noting that artisanal fishermen still account for 80% of Chile's swordfish catch.

A Gradual Policy

The researchers have been careful to proceed slowly and in stages in their relations with the fishing communities. Their efforts were initially concentrated on two ports only. Maria Angela Barbieri lived in Quintay for a month. "We needed to be more familiar with living conditions in the small communities. We wanted to know what the fishermen were interested in, how they lived and what they talked about." During their stay, the researchers tried to establish a reciprocal exchange with some of the artisanal fishermen. "We didn't want to work with too many people all at once," Maria Angela Barbieri explained, "The first thing we had to learn was to use the satellite maps." The researchers asked if they could go out in the boats to measure the catch. In exchange, they provided information on promising fishing grounds taken from the satellite pictures. "When we returned to port and our boat landed a better catch than its competitors, the conversation started to flow more easily with the other fishermen. Curiosity got the better of them and more and more of them yielded to it."

In the second stage, the researchers established contact with the executives of the fishermen's associations and unions. "We prepared a slide show which was very well received by the local fishermen," Mrs Barbieri recalls, "At the end of the presentation, we asked the fishermen whether they would be interested in working with us. We wanted a collective commitment to demonstrate their interest in the project."

The briefing was normally designed as a verbal agreement, like an exchange of services: the researchers provided the maps taken from the satellite images and, in exchange, the fishermen filled out sheets giving the university data on their catch.

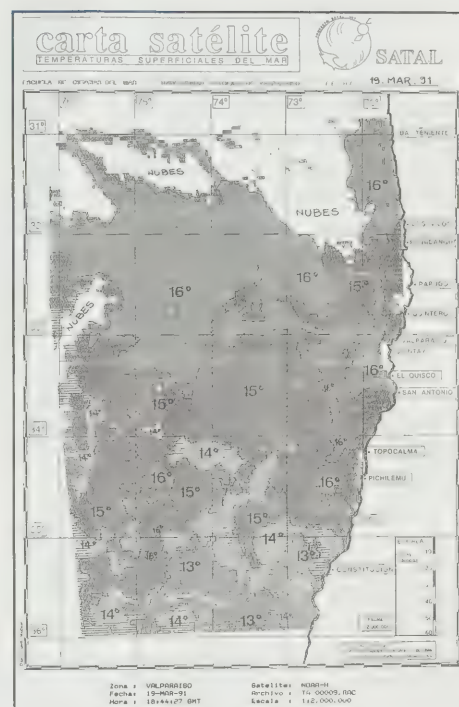
The Contract Emerges

Once this agreement had been concluded, the researchers established short, informal courses. These courses covered how to use and read the satellite maps, as well as basic principles of instrument navigation. A third course on on-board safety was dropped. The researchers found it hard to interest the fishermen in such courses, even if they were practical courses given in the communities themselves, prepared by people who were thoroughly familiar with the local fishery.

As well as the maps, the fishermen associated with the project received a regular newsletter. Published 10 times a year, the newsletter gives technical data on the maps, as well as on fishing gear and Chilean legislation affecting the fishery. It also provides a vehicle for consolidating the relationship between the researchers and fishermen and for feedback to deliver to the fishermen some of the results of research carried on at the School of Oceanography.

Plans now call for improving data analysis, map production, the dissemination of the information to a larger number of artisanal fishermen on the coast of Chile. The researchers would also like to see how this kind of technology might be applied in other fishing communities in developing countries. At the same time, serious attention must be given to mechanisms for making such a service pay for itself, because the maps, for all their usefulness, cost \$70, and the day is coming when the cost will have to be passed on to the users.

Robert Charbonneau



With maps like this fishermen now have an important advantage.



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CORAL DESTRUCTION FOR AN AQUARIUM

In a quietly bubbling aquarium, a fire goby, its red tail singed with black, flits among the clown fish and the coral. This tranquil scene might be in any home or office in the developed world where the tropical fish industry is a multimillion dollar business. But in the Philippines, the source of 70% of the fish favoured by aquarium enthusiasts in North America, the industry is causing environmental disaster and reductions in the food supply.

Cyanide is responsible for the destruction. Although it is illegal, 80% of the tropical fish are caught in the Philippines using the chemical. It is squirted from plastic squeeze bottles into the coral reefs where the fish hide. In addition to stunning the fish intended for capture, the cyanide kills other fish, eggs, larvae, and molluscs. Repeated applications damage the reef and threaten the million of tiny

animals that form the coral reef itself. "Killing the reef is like burning the corn crop in your barn," says Don McAllister, "You destroy both food and shelter."

McAllister is one of the coordinators of a project that is teaching Filipino fishermen how to use hand-held nets instead of cyanide to catch tropical fish. The project, which is funded by IDRC, is jointly administered by the International Marinelife Alliance (IMA) of Canada and the Haribon Foundation for the Conservation of Nature in the Philippines.

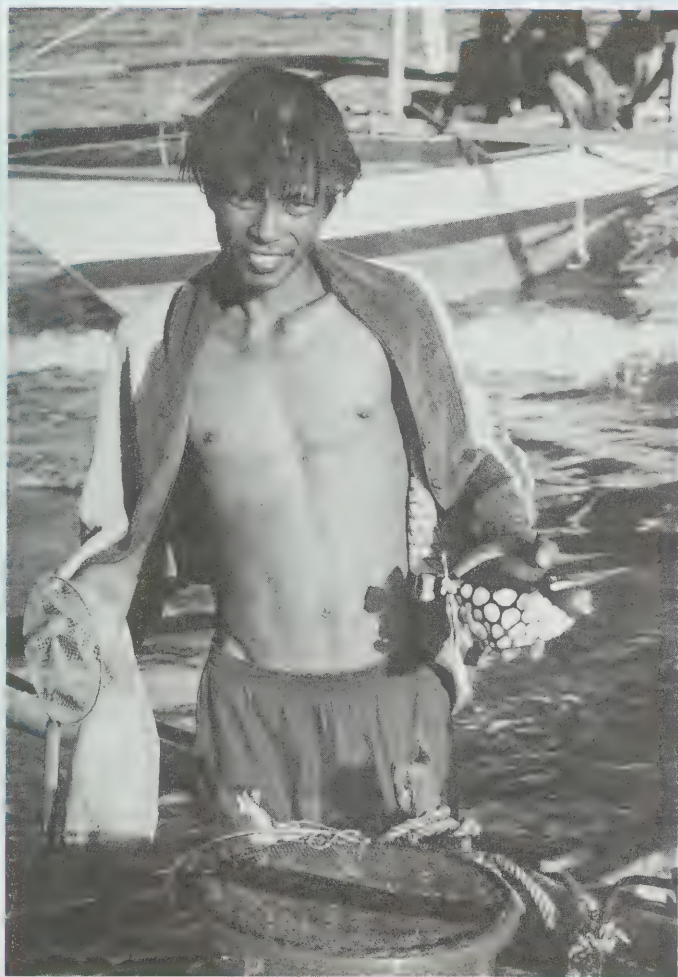
The Philippines has 33,000 sq km of coral reef, which supports the tropical and food-fishing industry. The reef also attracts tourists and acts as a natural breakwater for coastal settlements. Eighty per cent of the reef is in fair or poor condition, owing to dynamiting (for use in construction) and sedimentation (mainly erosion from deforestation).

The resulting decline in fish harvests has led to unemployment, rural emigration, and loss of income. A dead reef produces only one-seventh the amount of food of a healthy one and, although a thriving 1000-sq m area of reef can feed 800 people for a year, a reef in ruin can only support 200. In a country where people rely on fish for half their protein consumption, the implications are grave. Already, about 25% of Filipino children suffer from malnutrition.

Substituting small-mesh nets for cyanide will help improve these statistics. The nets are a self-sustaining technology that allows the fishermen to catch only what they need. To encourage their use, the IMA-Haribon project holds net-training courses that are taught by former cyaniders. The instructors also discuss reef ecology, basic fish biology, and underwater safety. The courses are held in the fishing villages, and all residents are



In the Philippines, cyanide is squirted into the coral reefs to stun fish intended for capture, but other fish are affected too, and the damage to the reef endangers future species.



Filipino fishermen are being trained in how to use hand-held nets instead of cyanide to catch the prized tropical fish destined for aquariums around the world.

welcome to attend. Participants are also encouraged to form a community reef management group. "We give them some ideas about how they can control their own affairs and not depend on some so-called expert," says McAllister. At the end of the course, each fisherman receives a certificate and a net.

The economic arguments for using nets are persuasive. A fisherman currently spends US\$500 for cyanide each year, which represents about half his gross income. The nets cost only about US\$25.

There are also health benefits to abandoning cyanide. The fishermen develop rashes after spending hours swimming through clouds of the chemical. They often bring home some fish to eat and whole families develop intestinal problems from ingesting cyanide. The most severe personal risk of cyanide use, however, is accidental inhalation, which can result in death. Moreover, because of the death of the reefs, divers are going deeper with attendant risks from the bends and other deep-sea dangers.

Of the 1500 regular cyanide fishermen in the Philippines, 200 have been successfully taught how to use nets. An important ecosystem is on its way to being restored, along with the health and livelihood of thousands of Filipinos who depend on the riches of the reefs.

Jennifer Pepall, a freelance writer based in Ottawa, Canada



Courses organized by the IMI-Haribon project teach the fishermen how to use the nets, reef ecology, basic fish biology, and underwater safety.



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FRONTRUNNERS OF CHINA'S AGRICULTURE



In Shandong province, one AVRDC variety of mungbean yielded 55% higher than the local variety. The accumulated economic profit for Chinese farmers was valued at US\$33.2 million.

The impact of China's burgeoning population of almost 1.5 billion people has been felt sharply in the areas of agricultural production and food availability.

The agricultural needs of this growing populace are persistently straining against limited land resources. In some parts of China, the population must be fed from less than 400 sq m of land per capita. That is more than 2500 people relying on food farmed from 1 sq km of land.

High production agriculture is a priority in China. But, despite its labour-intensive farming system, Chinese agricultural production is relatively inefficient by modern standards. Limited crop yields, combined with a marked shortage of highly trained specialists in modern crop production and farm management, point to a potential crisis in the country's ability to feed its population.

An 8-year long Asian Vegetable Research and Development Centre (AVRDC) project, supported by IDRC, has attempted to bring about change in the productive capacity of China's agricultural system. The major goal of the project is to aid in conducting crop yield trials of certain vegetables like Chinese cabbage, tomato, soybean, mungbean, and sweet potato.

"Improved strains of these vegetables are developed at our agricultural centre in Taiwan and our station in Thailand and then tested in various parts of China," says AVRDC's Thailand Outreach Program director Charles Y. Yang. "These are our principal crops."

The experiments in crop production have been particularly successful in improving the yield of mungbean in China. Planted as an important crop in various regions of China, local strains of mungbean are vulnerable to diseases such as *Cercospora* leaf spot and powdery mildew. Two of the new

strains of mungbean developed by AVRDC are resistant to these diseases and five lines of the vegetable have outyielded the traditional Chinese local mungbean lines by 20%.

In Shandong province, for example, one variety of mungbean yielded 55% higher than the local variety. The accumulated economic profit for Chinese farmers was valued at US\$33.2 million.

A particular AVRDC-developed strain of mungbean, called Zhong Lu #1, now occupies 25% of the total mungbean production areas of China, estimated to be more than 253,000 hectares.

"We are very pleased with the success of our mungbean lines," Yang says. "Since 1985, we have planted over 360,000 hectares of this crop with an estimated economic benefit to Chinese farmers of over \$US175 million."

The AVRDC strains of Chinese cabbage also showed positive signs of increased yields. Many of the lines of cabbage were combined with superior open-pollinated cultivars, generating more than 98 cross combinations. Five superior lines of cabbage were selected and the net yield of these were more than 40% higher than traditional strains of cabbage.

"Most of the AVRDC Chinese cabbage attracted the interest of Chinese farmers because of their heat tolerance, early maturity, excellent eating quality and attractive head shape," Yang says.

Between 1987 and 1989, a total of 2.7 tonnes of improved Chinese cabbage hybrid seeds have been produced by Chinese scientists cooperating with AVRDC. The total monetary profit from the Chinese cabbage is valued at more than US\$2 million.

The results from the other vegetables like sweet potatoes were mixed: some varieties outyielded the local Chinese varieties, others did not.

But this ambitious project has much more to it than agricultural trials and breeding experiments. Yang and his associates have been looking at ways to analyze and reduce the effects of

diseases on certain vegetables. Two particularly destructive diseases hindering Chinese agricultural production are soybean rust disease and tomato virus disease.

"Despite financial constraints, the surveys on soybean rust disease in several provinces of Central and Southern China and on virus disease of tomato are being conducted intensively," Yang explains. He believes that the success of these surveys depends on the cooperation of local scientists, development agencies, and farmers. In 1989, the Oilseed Crops Research Institute of the Chinese Academy of Agricultural Sciences (CAAS) agreed to be responsible for organizing and leading the soybean rust survey in China. Meanwhile, the study of tomato virus disease has been jointly undertaken by the CAAS and the Jiangsu Academy of Agricultural Sciences.

In addition, AVRDC is interested in what it considers perhaps the most important element of Chinese agriculture — its people. A total of 48 Chinese researchers have attended one of the annual 5-month AVRDC regional training courses at Kasetsart University in Thailand. The training scholars can come from as many as 10 countries in the region. "The course has been successful in producing a

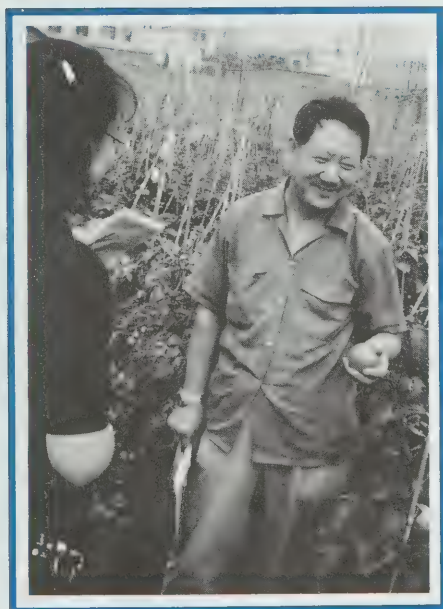
core of well-trained scientists who become the frontrunners of vegetable production and research when they return to their home country," Yang says.

Another important aspect of this project, Yang believes, is the continued exchange of information and germplasm between AVRDC and cooperating institutions in China. There are nine agricultural organizations in China participating in the research, stretching from the Guangdong Academy of Agricultural Sciences in Southern China to the Xinjiang Academy in the north. AVRDC and these academies regularly exchange scientific reports, publications, bulletins, and newsletters.

Indeed, through this project, several leading Chinese researchers were able to attend some important AVRDC-sponsored international workshops outside China. "This kind of interchange can foster scientific cooperation among scientists, advancing research and development in agriculture around the world," Yang says.

Both IDRC and AVRDC believe the root of Chinese agricultural improvement can be found through a two-pronged approach: the development of superior strains of specific vegetables and the training of skilled scientists in crop production and management. The approach has had success in the past, in terms of riper tomatoes, leafier cabbage and bigger mungbeans. Those involved in the "Vegetables in China" project hope that this trend will continue well into China's farming future.

Craig Harris, a Canadian journalist



Vegetables in China

Bigger
and
Better



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Republic of China
Telex: 73560 AVRDC
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USING AN "EXPERT"



Sri Lankan tea processing is typical of many Third World businesses. A low-technology industry, experience is the key to success.

Human operators still control by hand all aspects of withering, crushing, and drying green tea leaves. Not surprisingly, quality, consistency, and profits can all vary substantially from factory to factory and even from shift to shift.

This may not be the case for long. Sri Lanka is the initial testing ground for an "expert" computer system called Synapse. Designed with IDRC support by researchers at the National University of Singapore (NUS) and Total Recovery Systems International of Toronto, Canada, the system is capable of competently supervising tea drying or, for that matter, just about any finicky process.

Synapse grew out of Dr Hari Gunasingham's dream to computerize his chemistry labs. The NUS lecturer envisioned a teaching system that could help students grasp the basics of experimental design. Essentially, it would help them decide in a logical manner how to configure a complex process.

But the aims of this project soon expanded. "With electronics so cheap, we wanted to come up with something that would work in developing countries without the benefit of extensive computer training to improve their scientific and technical processes."

What ultimately emerged is an affordable, flexible, and natural system that can run on any IBM personal computer or clone. The basic package is expected to sell for less than US\$1500. This includes the software brains of Synapse, plus any required hardware interface cards that link electronic gauges, valves, and other devices to the computer.

Besides tea dryers, the system is ideal for soap makers, cheese producers, pesticides manufacturers, and other industries where maintaining quality control is a must. It is also suitable for overseeing instruments used in fisheries, agriculture, environmental monitoring, research, and health care.

Synapse can be learned inside out in minutes, even by users who have no previous experience with computers. What counts, however, is familiarity with the process being automated. It is called an expert system because it "captures your expertise," explains Wong Mun Leong, an NUS research assistant. Basically, users input all the shortcuts, rules of thumb, and so on necessary to keep a process under control.

Users "draw" their process on screen by selecting various shapes and symbols from an extensive menu of "icons." In this manner, it is possible to represent hot-air blowers, thermometers, valves, humidity gauges, pH meters, condensers, and other essential equipment.

Step two involves transferring expertise. Here, users specify which instruments require monitoring by the computer. Then, in response to the system's prompts, "they just state the facts," says Wong. "For example, someone might tell Synapse to open a valve when the temperature soars above or sinks below a certain range, and to keep it closed at other times."

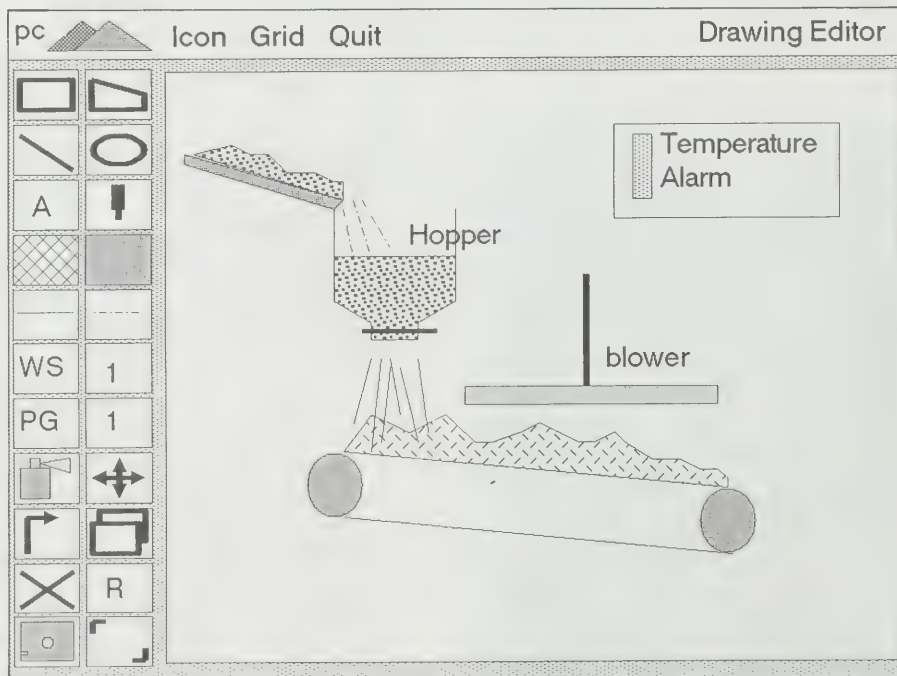
Once such information has been input, Synapse takes charge, he says. It can add ingredients, monitor colour, and check consistency at routine intervals. In the event of a problem, the system can sound an alarm — and even troubleshoot if so instructed.

According to Wong, the system's benefits extend well beyond the obvious ones of improving efficiency and quality. Synapse is also a form of insurance, he argues. It protects companies against the headaches of starting from scratch, in the event "the head operator suddenly resigns and takes all the company's knowledge with him."

John Eberlee, a Canadian journalist



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The "expert" computer system, Synapse, is capable of competently supervising a tea drying process or any specialized processing industry.

BRINGING VIDEO WITHIN EVERYONE'S REACH



A small crew of Honduran video artists is shooting a documentary about Jesus, a Tegucigalpa ice-cream vendor. The crew is well-intentioned but inexperienced and compounds mistakes with clumsiness, compromising the impact of the documentary.

It is an ill wind that blows no good, however. The Honduran crew's experience became the starting point for a course aimed at individuals or groups who want to familiarize themselves with video or perfect their technique.

This is "Portable video production," a training kit consisting of three volumes and a video cassette with a running time of about 45 minutes. Designed for people in developing countries by Vidéo Tiers-Monde, a Montreal-based NGO, this educational tool is available in French, English, Spanish, and even Italian.

"The kit can be used in a variety of ways," explains Alain Ambrosi, president of Vidéo Tiers-Monde. "It can be a classroom tool in training seminars and also act as 'teacher' to those learning on their own."

The video document is clear, simple, and accessible. It takes the viewer point by point through the basic rules of producing an effective documentary. The student begins by watching the clumsy documentary about the ice-cream vendor produced by the Honduran crew.

The second part of the document follows the same crew, but this time they have decided to improve the impact of their message and start the documentary again from scratch. One by one, the basic rules are reviewed from the script to editing and sound track and with them the crew is able to produce a far superior story, which we see at the end. All through the second production the viewer is encouraged to refer to the manual in the kit, which explains in detail the rules that are outlined in the video.

Alain Ambrosi observes that "video is spreading like wildfire in the communities of the South. Community groups use it as an educational tool, while some Indian



Video is spreading rapidly in the South as an education tool for schools and as a communication link between villages.

tribes use it as a means of communication between villages. In a political context, the camera can follow a visiting government representative closely without missing a word he says: you never know when that might be useful..."

Video is also becoming a powerful means of cultural dissemination and an alternative to official networks. Community television networks run directly by groups or communities are now developing.

The kit, therefore, meets a very real need, and more than 600 copies are already in circulation in several countries in Africa, Latin America, and even in the North. Educational institutions in Quebec and elsewhere in Canada have acquired it; the Italian version has been highly successful and a Swedish version is in the works.

When it was screened at Corpovision 1990, Montreal's first corporate video forum, "Portable video production" was the winner of the ADATÉ/Maurice Proulx prize, awarded to the training video that best achieves its educational objectives.

The kit sells for about \$250 in Northern countries and \$75 for orders from developing countries.

Louise Gendron, a journalist in Montreal, Canada.



In Europe: (French or Italian kit, PAL)

Organisation catholique internationale du cinéma et de l'audiovisuel
[International Catholic film and audiovisual organization]

c/o Jean-Paul Guillet
Pala 220, San Calisto,
00120 Citta del Vaticano
Roma, Italia
Fax: 39.6.698.7335

In Latin America (Spanish kit, NTSC or PAL)

Instituto para America latina
Apartado postal 270031
Lima 27, Peru
Fax: 51.14.46.63.32

In North America: (French or English kit, NTSC)

Vidéo Tiers-Monde
3575 Saint-Laurent, Suite 608, Montreal, Quebec, Canada, H2X 2T7
Fax: (514) 982-2408

A WELL-OILED INDUSTRY



Steam distillation units are helping hundreds of families in Cochabamba, Bolivia, to earn a steady income in the "essential oils" business.



Gather leaves and stems. Steam them over a fire for several hours. Collect the liquid residue. Then let the oil drain off.

These four steps, simple as they may sound, are the basis for a highly successful "essential oils" industry that has recently taken root in one of Bolivia's poorest regions.

Over the past 5 years, 10 farming cooperatives have sprung up in Cochabamba province, an area characterized by high unemployment, and dozens more may soon be formed.

Each co-op has obtained a steam distillation unit from the Universidad Mayor de San Simon's (UMSS) "Programa Agroquimico." Today, the units are helping hundreds of families earn a steady income turning eucalyptus, mint, or lemongrass foliage into crude eucalyptol, menthol, or citral. Each steam distillation unit is associated with a community of 80-130 families. The crude oils produced in the various communities are then sold to the University's Programa Agroquimico, which in turn refines them into higher grade oils. The then purified oils are sold to Bolivian manufacturers of candies, soaps, detergents, deodorants, and other household products. Cochabamba's fledgling cottage industry has already made Bolivia self-sufficient in essential oils. Five

years ago, the country spent close to US\$700,000 on imports. Since January 1990, however, Bolivian manufacturers have obtained all the oils they need through the Programa Agroquimico.

Fortunately, there is no shortage of raw material. "We only need about 200,000 eucalyptus trees to meet our domestic needs," says Luis Arteaga, director of the Programa Agroquimico, "and there are more than 5 million trees standing in the Cochabamba region alone."

To get the oil extraction industry started, IDRC helped Arteaga's organization develop techniques for purifying the crude oils and characterizing the refined, final products. In this regard, interaction with Canadian scientists and training played key roles. For example, two Bolivian researchers spent 6 months in Canada learning how to use gas chromatography, an effective means of identifying complex compounds and their components.

By comparison, the training Arteaga and his colleagues provide to interested co-ops is a lot less complicated. "We work with them for about 2 weeks until they understand the basics of steam extraction. We find they adapt themselves very easily to the distillation units."

Each unit comes with a 5-cubic metre extractor, a steam-boiler, a condenser, and a separator. Constructed from local materials, the equipment costs about \$10,000. It only takes 3 or 4 years, however, to pay back this investment, he says. "We buy what the peasants produce but retain 10% toward this goal."

That leaves plenty for all the families concerned. Crude oil currently fetches between \$3.50/kg for eucalyptol and \$9.99/kg for menthol. Distillation units can hold up to 5 tonnes of fresh plant material at a time, which is roughly equivalent to 50 kilograms of oil. Each co-op community can, therefore, generate \$150 or more for every day a unit is in use.

With normal agricultural activities to take care of, most co-ops are not using their distillation units every day, says Arteaga. "In times of harvesting, planting, and so on, production of crude oils necessarily decreases." Still, he estimates the profits from each distillation unit average more than \$30,000 every year.

Under their agreements with the University, each co-op has control over how its profits are distributed. Not surprisingly, different co-ops have adopted different organizational structures. "One of our best extraction units is run entirely by women, he says. "Somehow, they've managed to achieve crude oil yields that are 50% higher than anything our researchers ever obtained during pilot studies." One reason for these yields may be the added care taken in on-site selection of raw material that ensures more success.

For Arteaga, this example illustrates what is best about the industry. "People used to just wait for good harvests. Now, they're beginning to realize that if they work harder, they can produce more."

John Eberlee, a Canadian journalist



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BUILDING MADE EASY



Homes in the shanty towns of the developing world offer only the meanest of shelter — perhaps a roof of cardboard or flattened oil drums and walls of sacking. But in India, slum dwellers have an alternative. They can now consult drawings that show them how to build housing that is both affordable and effective.

The Communication Centre of Scientific Knowledge for Self-Reliance (CCSK) in Paris has created a series of picture scripts that teach house-building methods to the poorest citizens of India. "This not only means people with low income but often with no income," says Yona Friedman, an architect and the Centre's coordinator. He also led the IDRC-funded project to develop the scripts.

Social dislocation in India has resulted in a proliferation of shanty towns in urban areas and squatter camps clustered around agricultural estates and mining towns. Local governments cannot possibly afford to erect appropriate housing for all those who need it. The picture scripts show people how they can build their own homes using easily available material and techniques that do not require a lot of time, money, or tools.

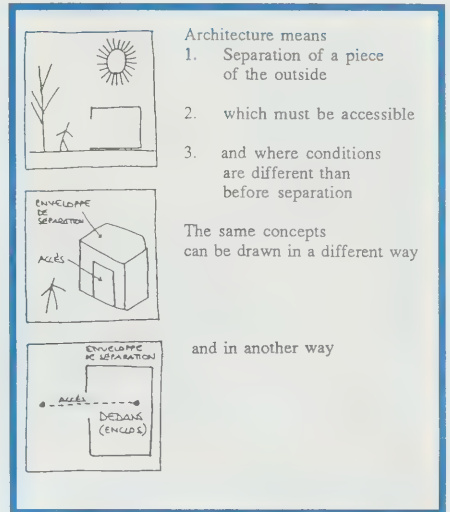
The scripts represent technical information that has been translated into simple drawings. "The drawings have to be simple so people feel they can do it themselves," says Friedman. The pictures can be easily copied and

allow people who are illiterate to interpret information directly, rather than through an intermediary. The drawings are also accompanied by short explanations.

The scripts are compiled into a series of manuals that concentrate primarily on roof construction. A roof is the most important element of housing and the most difficult part to build.

A typical script shows how to flatten empty tin cans and turn them into sheet metal. Another describes how to use old bottles to let light into a dwelling. Bamboo figures prominently in the scripts as it is a strong and inexpensive building material. It is also readily available — people can even grow their own. Aluminum foil is also cheap and provides good insulation from heat and humidity. The variety of materials and methods described in the scripts takes into account India's varied climate zones. In a monsoon area, for example, bricks make sturdier walls than do bundles of grass.

CCSK distributes the manuals to several Indian organizations and government institutions for dissemination throughout the country. The manuals are designed to be adaptable to any audience and have been used in schools and literacy campaigns as well as in magazines and posters. Even representatives from individual villages have asked for the scripts.



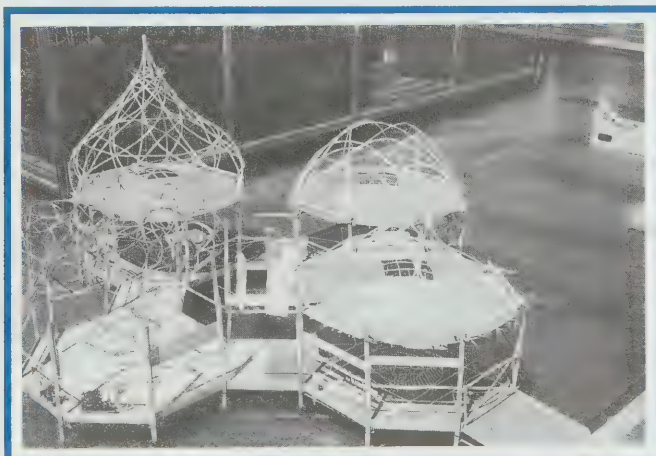
The "picture scripts" offer a simple way to communicate.

The written descriptions have been translated from the original English into Hindi, Urdu, Tamil, and several local dialects. "There are no two places where the manual is in the same form," says Friedman.

In addition to the IDRC-funded modules on housing, CCSK has developed others that address such concerns as health, nutrition, water management, and sanitation. Friedman believes that it is impossible to separate shelter from these other basic needs. A roof, for example, can also collect water, provide shade for a garden, and shelter food.

According to Indian estimates, CCSK's scripts have reached 10 million people. They will eventually be combined into a Popular Encyclopedia of Survival. Then perhaps even more roofs of bamboo rings and tinfoil will rise above those of cardboard and cloth in the shanty towns of India.

Jennifer Pepall, a freelance writer based in Ottawa, Canada



A scale model built from picture scripts



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NEW TEST FOR AIDS



A research team of the Program for Appropriate Technology in Health (PATH), an international NGO based in Washington, DC, USA, has received funding from IDRC and the Rockefeller Foundation to develop an HIV-1 screening test appropriate to conditions in developing countries: one that is simple, quick, affordable, and can be manufactured in the developing countries themselves. Initial field tests indicate that PATH has successfully met the challenge.

The breakthrough comes not a moment too soon for the AIDS situation in Africa continues to deteriorate. In Africa, 5–10% of HIV infections occur through blood transfusions. This source of HIV is technically preventable. HIV tests are little used outside the major centres, despite the frequency of blood transfusions. "In Africa, anemia is a leading cause of hospitalization," explains Don de Savigny, a program officer in the Health Sciences Division at IDRC, "and this anemia can be so serious that it is life threatening and is often managed by a blood transfusion." The vast majority of severe anemia cases occur in rural areas where district hospitals can ill afford conventional methods for detecting HIV contaminated blood.

A number of African studies indicate that blood transfusions are still frequently used to manage anemia often caused by malaria.

A single hospital, the Mama Yemo in Kinshasa, Zaïre, performed 12,800 blood transfusions annually in 1985/6, most involving women or children left anemic by malaria. An estimated 560 children contracted the AIDS virus during that year. Since then, the number of blood transfusions performed in this hospital, as in most African institutions, has declined considerably. Blood from donors is frequently contaminated with hepatitis-B, malaria, syphilis, or HIV-1.

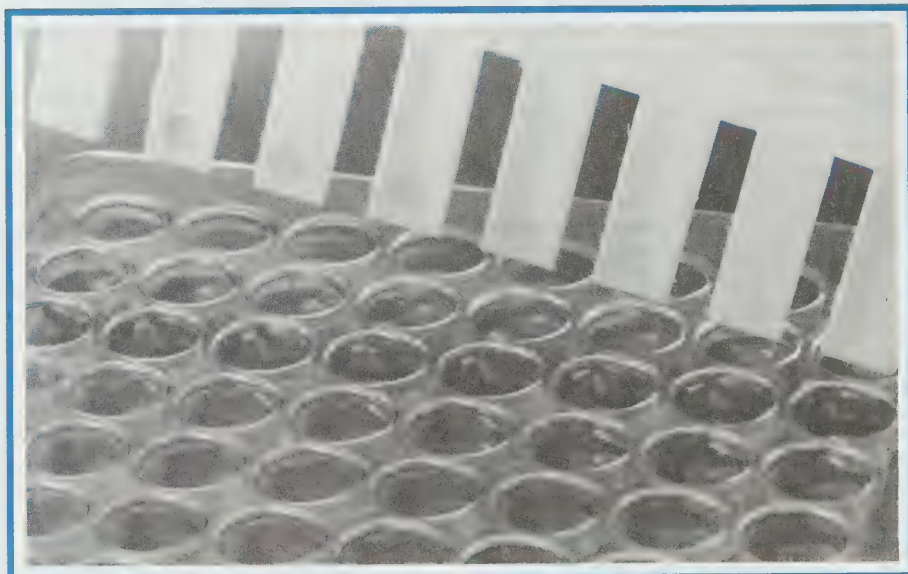
WHO has suggested procedures to increase the accuracy with which anemia can be diagnosed and recommended ways to reduce the number of blood transfusions in African countries. The rate of

posttransfusion complications, nevertheless, remains abnormally high in comparison to Europe: 15% of cases in Kinshasa compared to 2% in Europe. Milton R. Tam, PATH's technical director, admits that the development of the HIV ImmunoDot Test (the name chosen for the test) stems from a conviction that "a test that works in the developing countries should also work in the developed countries." The researchers did not spare themselves in terms of the demands they imposed before starting work, and the results fully meet expectations: the ImmunoDot produces results in 20 minutes; it is highly sensitive, easy to interpret, requires no refrigeration, special equipment or instruments, and the unit cost is less than US\$0.25. Plans are underway to start its manufacture in the developing countries.

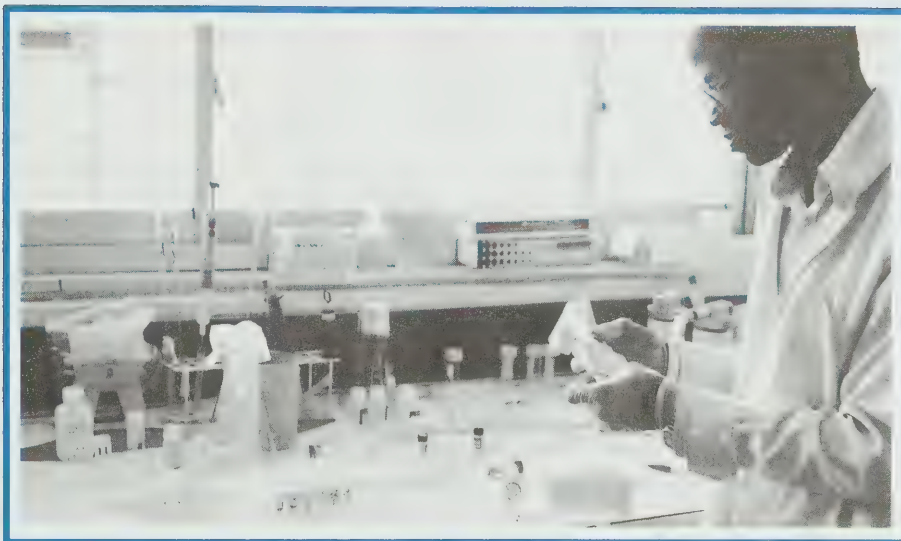
The ImmunoDot test device looks like a small plastic comb consisting of eight "teeth" or tabs activated by a synthetic peptide derived from the GP41 molecule. The GP41 molecule is part of one of the proteins that make up the envelope of the HIV-1 retrovirus. These amino acids are part of an antigenically potent yet conserved molecular region of the

protein and are, therefore, highly reactive in serological tests. The design of the comb allows testing of eight serum samples simultaneously. The comb, however, can always be cut to test fewer samples.

First, the comb sits in the blood specimens to be tested for 10 minutes at ambient temperature. It is then washed in a saline solution and set to incubate for a further 10 minutes in an indicator reagent after which it is washed again in a saline solution. Once it has dried, the reading is simplicity itself: a red dot appears on each tooth that has been in contact with an HIV-positive serum. The procedures are so simple that clinic personnel and technicians in developing countries can learn to use them in a few hours. Blood banks in developing countries, clinics in resource-poor settings, and bush hospitals appreciate its low cost in comparison to the screening methods currently available. Most tests in current use, including the ELISA test, cost at least US\$2 (and sometimes as much as US\$7) a unit: as compared to an estimated unit cost for the ImmunoDot of US\$0.12 (assuming a production run in excess of 500,000).



The HIV ImmunoDot Test — simple, quick, affordable — can be manufactured in developing countries and should be effective in developed countries as well.



The manufacturing cost distinguished the ImmunoDot from most commercial products.



The manufacturing cost distinguishes the ImmunoDot from most commercial products. Several private companies have developed similar tests, especially membrane tests, but at unit costs approaching \$60.

Stable and Accurate

The PATH HIV ImmunoDot Test is stable for up to a year at ambient temperatures typical in Equatorial Africa (30°). Most important, comparative tests have demonstrated its accuracy. The ImmunoDot's sensitivity remains virtually unaffected, which is exceedingly important in blood banks that cannot allow transfusions using contaminated blood. The test is, furthermore, comparable to other tests as far as specificity is concerned. When compared with the ELISA or Western Blot tests, the ImmunoDot occasionally identifies serums as positive when

they are not, which can be expressed as 98.2% specificity. In other words, the test "occasionally sounds the alarm for no reason." The consensus is, however, that such false diagnoses are relatively rare and can be corroborated by other tests in current use, such as Western Blot or ELISA. "In the case of the blood banks, it's preferable to discard a unit of a donor's blood than to transmit the AIDS virus," comments Dr Gilles Forget, associate director of IDRC's Health Sciences Division.

The experts agree that none of the screening tests on the market is free of such false diagnoses and that the ImmunoDot test performs adequately in this regard.

A number of laboratories in Belgium, Kenya, and Thailand, including the Canadian Federal Centre for AIDS, collaborated with PATH and WHO's AIDS Program in evaluating the

ImmunoDot's diagnostic performance. IDRC is active in enabling manufacturers in developing countries to acquire this simple, inexpensive, and important technology.

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THE LOST DECADE OF DEBT CRISIS



After a period of continuous economic growth following World War II, Latin America lapsed into the "lost decade" of the 1980s. The handling of the debt crisis was one of the key reasons for this poor economic performance. But to understand the current debt crisis, the roots of the problem must be explored.

When the price of oil skyrocketed in the 1970s, many international banks found themselves with large amounts of "petro dollars" deposited by wealthy OPEC countries. These banks were eager to lend the money at low, sometimes negligible, interest rates. But they needed credit-worthy countries to recycle this new-found money.

Past high growth rates and high per-capita incomes singled out a group of Latin American countries as tempting targets for international banks. Loans were also tempting to the many Latin American countries facing balance-of-payments problems resulting from inward-oriented industrialization. The governments of these countries were faced with the options of severe economic adjustment (a politically unpopular decision) or incurring new commercial bank debt, which was being pushed by aggressive bankers.

The politically less costly route was followed. Abundant nonconditional funds were lent to several countries such as Mexico, Costa Rica, Peru, and Brazil. Governments accepted more and more international loans to sidestep the structural problems of reorganizing their economies.

In August of 1982, Mexico announced that it was unable to meet its scheduled repayments, marking the beginning of the debt crisis (although smaller highly indebted countries were already in default). As the crisis unravelled many of the problems of the international banking system became apparent.

Banking regulations in the industrialized countries, at that time, did not deal with their banks' international operations, particularly if they were in currencies other than the bank's country of origin. Thus, a bank's international decisions were not part of regulatory policy. It was also believed, somewhat naively in retrospect, that loans to a sovereign country were low-risk, and there was little discussion of the dangers of bank overexposure.

The debt crisis clearly revealed the overexposure of the large banks, particularly those in the United States. Both creditor and debtor governments agreed that a large financial crisis had to be averted. But the way the crisis was dealt with remains questionable.

The priority of the creditor governments was to protect the overexposed banks by preserving the book value of sovereign loans. This meant that debt owed to international banks by Latin American countries was preserved at an artificial level. The operation of market forces, which would normally tend to devalue financial assets committed on unsound premises, were suspended to the banks' benefit.

The "Case-by-Case" Approach

The case-by-case approach was developed around the logic of preserving the book value of the loans overexposed banks made to overindebted borrowers. Book value could be maintained, according to US regulations, if interest arrears did not fall behind by more than 90 days. This required adjustment by individual Third World debtor countries to generate a trade surplus to meet interest payments. One of the main goals of adjustment became maximizing interest payments from debtor countries to guarantee a return on loans for commercial banks.

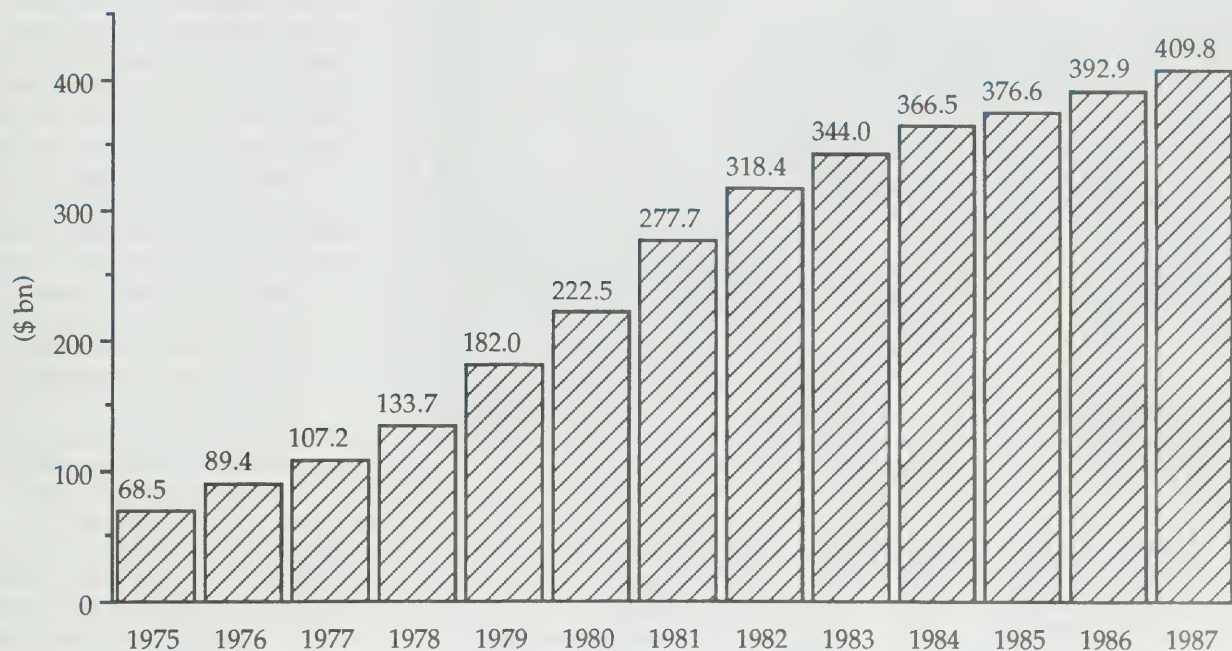
After inspection from the International Monetary Fund (IMF), the remaining financial gap in external obligations had to be met with "fresh" funds — more loans from multilateral and bilateral institutions and the commercial banks themselves. These loans were approved on the condition that structural reforms were made, thereby creating an environment for long-term growth. This method of refinancing was a tightly knit pattern of cross-conditionality.

The first step in cross-conditionality emerged as each lending institution tended to condition its participation in each specific "case" to the participation of other agencies. Each agency had a list of specific conditions to observe before loans were made. Often these conditions were based on philosophical or political preferences for which there was no clear-cut technical or professional basis. A complex game of simultaneous negotiations followed in which any one agency could hold either other agencies or the country hostage in exchange for agreements to meet certain conditions.

A second stage in cross-conditionality appeared in the implementation of the individual programs. The performance criteria of any one agency also became conditions for loans from other agencies. The straitjacket was made even tighter in the loan agreements of the commercial banks, which included as conditions for disbursements or rescheduling all possible conditions in other agencies.

Closer cooperation among donor agencies became inevitable in the 1980s and this was, to some extent, desirable. But in terms of extensive cross-conditionality it was costly and often counter-productive for Third World countries. Debtor countries were forced to jump through a series of difficult and, at times, conflicting hoops to either reschedule their debts or qualify for multilateral loans and grants.

Meeting interest payments on commercial bank debt made debtor countries increasingly reliant on the cash flows of multilateral agencies. But these loans and grants were negotiated and disbursed only under tight conditionality arrangements. As expected, debtor countries have been straining to achieve policy reforms under these restrictive conditions. Noncompliance to the conditions of the lending agencies has become the rule and not the exception.



Latin America: the inexorable growth of the foreign debt. Source: ECLAC

The key question is whether long-term economic growth and stability can be achieved in the face of adjustments tailored to meet interest rate payments for commercial banks. The desire to maximize interest payments has proven incompatible with economic growth and stability in many countries, especially those shifting from an inward to an outward looking development strategy. The "lost decade" in Latin America is, in part, the result of preserving the book value of commercial loans at the expense of other goals like growth and stability.

Signs of Change

There have, however, been signs of change over the past few years. The banking industry is undergoing deep structural changes as financial markets are becoming more and more integrated. Competition has increased as Japanese and European banks have displaced North American banks from top world positions.

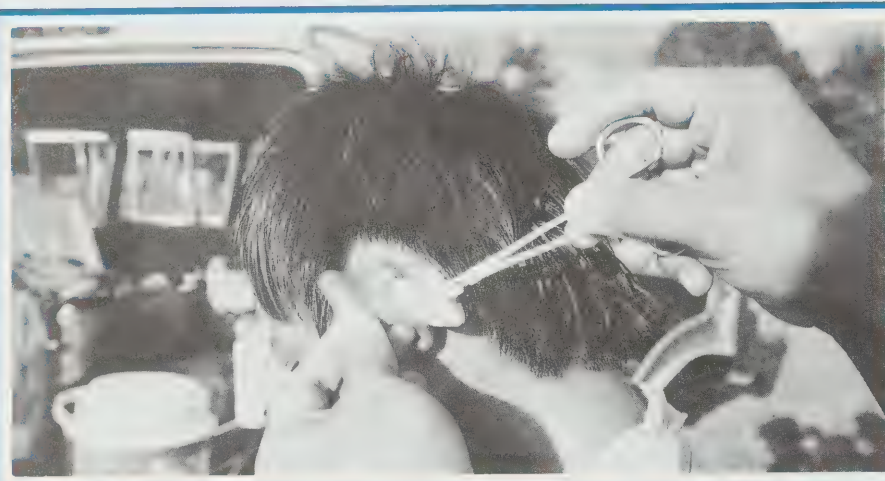
As a result, undercapitalized banks are seeking new strategies to raise capital and improve their portfolio. In terms of sovereign debt, these strategies include selling or securitizing debt at a discount, increasing loan loss reserves above the required levels, and debt swaps of various kinds. Market solutions for Third World debt have become the norm.

An example was the Brady Plan, named after former US Treasury Secretary Niles Brady, which explicitly supported market solutions. It enabled Mexico and Costa Rica to organize restructuring exercises involving debt reduction, with the full participation of the World Bank and IMF.

The logic of preserving the book value of commercial loans is over but its impact in terms of lost growth is not. The discussion, however, may reappear regarding multilateral debt, which up to now has not been formally restructured. As a consequence of the "case-by-case" approach and the relative sizes of the economies, more countries are facing serious levels of overindebtedness to multilateral agencies. Another round of debt crisis, this time primarily in small countries, may be in the making.

Ennio Rodriguez, former Minister of Debt and External Finance, Costa Rica

LEISHMANIASIS: SEARCHING FOR AN ELUSIVE CURE



The parasite has lodged in this young man's ear, a cure is unlikely.

Outside, daylight has barely broken, yet already one can hear the first trucks taking their load of woodcutters up the tropical forest. The men will spend the day chopping trees, which will then be sawn into beams of railroad ties.

For almost 45% of the inhabitants of La Libertad, an isolated rural community in the state of Campeche, the forest is a source of income and a means of subsistence. But the forest also represents danger.

Forest workers and land clearers run the greatest risk of being bitten by insects, and are most inclined to develop cutaneous leishmaniasis (commonly known in Mexico as "Chiclero's ulcer").

Dr Manuela Madera and epidemiologist, Alberto Vargas, are researchers with the Regional Research Centre of the Independent University of the Yucatan. They frequently travel to villages like La Libertad to treat cases of this debilitating disease.

Eusebio Diaz has an ulcerous sore on his ear that has grown alarmingly over the past 3 months. Eusebio is a young student of only 14. He claims he was bitten when gathering wood near the village. Dr Madera gently cleans the wound with antiseptic soap and distilled water. The parasite has lodged in Diaz' ear — a cure is unlikely. In fact, statistics indicate that in 25% of all

cases, such a diagnosis means the disease has become chronic. The rate of morbidity in such chronic cases is high, carrying serious consequences for individuals in these communities.

Victor Jeronimo, age 23, has an open sore on his left arm that will not heal. Vargas performs a biopsy and then gives Victor an injection of N-methylglucamine antimonate (TM Glucantime), a drug manufactured in France by Rhone-Poulenc. The drug is effective, says Vargas. "Approximately 80% of the cases of leishmaniasis recorded in the Yucatan Peninsula involve a single cutaneous lesion. They are easy to isolate and treat, provided the diagnosis is made early and the infection has not reached the ear. People with the disease generally respond well to the medication and young people are often completely cured."

But the medication is costly for a rural Mexican family. Between 20 and 30 injections at US\$2 each are needed to treat a single patient.

Chiclero's ulcer can be detected by injecting an antigen; the immunological reaction of the body is then evaluated. In 48 hours, a red spot at the site of the injection indicates an infection, but several months are needed before it is known whether the disease is chronic.

Researchers have begun to ask a number of questions about this perplexing disease. Why are some people infected without being sick? Why does the parasite sometimes lodge in the arm rather than the ear? What is the role of the insect vector in the cycle of infection? Is the immunological response genetically determined? How can the vector be controlled and the parasite eliminated?

The first step obviously consists of identifying the risk factors to which the population is exposed and in recognizing potential animal reservoirs and the specific vectors. It is for this reason that Madera and Vargas have been performing biopsies, making parasite cultures, taking blood samples, collecting vectors, administering drugs, and conducting lengthy interviews. All these data and samples are analyzed at the Regional Research Centre of the *Universidad Autónoma de Yucatan* located in the regional capital of Campeche.

The two researchers also meet with the forestry workers and land clearers working in the infested areas. They visit the damp areas where the vectors proliferate. The most common vector in Mexico is the *Lutzomia olmeca olmeca*. According to popular opinion, the insect comes out only at dusk. "Not necessarily!" say the researchers emphatically. Consequently, they are catching sand flies and conducting laboratory tests to determine if the insects are infected and with what parasite.

In Mexico, the parasite responsible for Chiclero's ulcer is the *Leishmania mexicana mexicana*. This flagellate protozoan infects certain animals. A female sandfly acts as vector; feeding on the blood of the infected animal reservoir, it transmits the parasite to humans. In the Campeche region, it is estimated that several species of animals could be natural reservoirs for the parasite: small mammals, monkeys, wild boars, rats, and other rodents. Even in this area, however, little research has been done to date to determine the most important animals in transmitting the infection to humans.

REPORTS

The research of the Universidad Autónoma de Yucatan is concentrated mainly in the state of C2 mpeche, where the disease is most prevalent. Ten years ago, Mexico had very little data on leishmaniasis. It was only in 1986 that Dr Fernando Andrade from the Department of Immunology at the University began the first study to determine the epidemiological profile of the disease. His research, supported by IDRC since 1985, made it possible to gain a better understanding of the nature of the disease, to develop screening techniques, and to assess the effectiveness of medication. This was one part of IDRC's overall plan to evaluate and implement control strategies for leishmaniasis.

This research revealed a leishmaniasis prevalence of at least 650 per 100,000 out of a population of 533,703. On learning of these high figures, the Mexican Health Department encouraged the

immediate establishment of a disease monitoring and control program in the Yucatan Peninsula. The Department also added microbiology, immunology, parasitology, and virology units to the University.

"Today," explains Dr Vargas, "research favours the social and ecological approaches. Researchers want to know who is bitten, at what time of day, at what location, and under what circumstances. They also want to assess what people know about the disease and to better understand how they react when they become infected." Vargas says the social and cultural beliefs surrounding the disease are also being addressed.

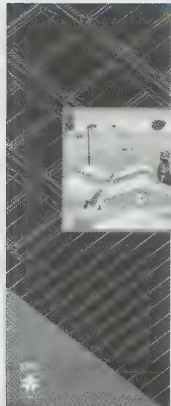

"Why do people hesitate to go for treatment at community health centres? Why do they wait until the sore has taken on alarming and irremediable proportions."

The research team of Vargas and Madera is attempting to establish closer ties with local populations through the community health centres. This cooperation, they say, makes it possible to identify high-risk groups and to promote the appropriate control measures.

Denis Marchand, a freelance writer based in Canada



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Dept of Immunology
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Merida, Mejico

	Publication	Abstract	Address
	"Solar-Powered Desalination: A case study from Botswana" by R. Yates, T. Woto, and J.T. Thage IDRC-TS65e	This book summarizes the results of an intensive 3-year field study carried out by the Rural Industries Innovation Centre (RIIC), Botswana, on the technical performance and suitability of various small-scale desalinators. Their findings indicate that certain models can provide a constant and adequate supply of potable water.	<i>Published by the International Development Research Centre (IDRC) in Ottawa, Canada</i>
	"Small Farmers, Big Business: Contract farming and rural development" by David Glover and Ken Kusterer	This book deals with an agricultural production and marketing system known as contract farming. In this system, a public or private agency purchases the crops of independent farmers through contracts, often providing inputs, technical assistance, and marketing.	<i>Published by Macmillan International Political Economy Series, Macmillan Distribution Ltd, Houndmills, Basingstoke, Hampshire, RG21 2XS, England</i>
		The book uses case-studies to assess the experience to date and to provide guidelines for the appropriate use of contract farming in the future.	

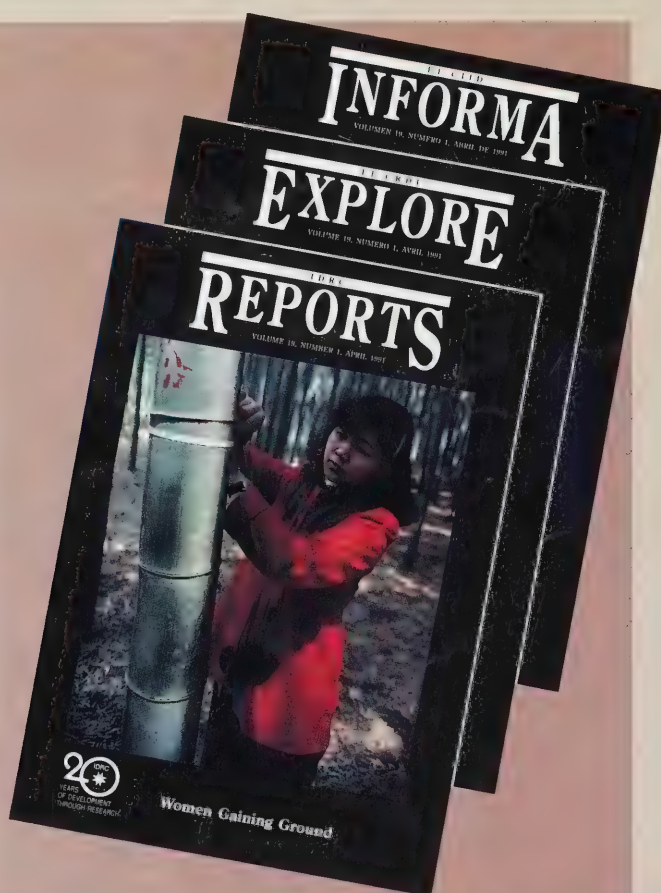
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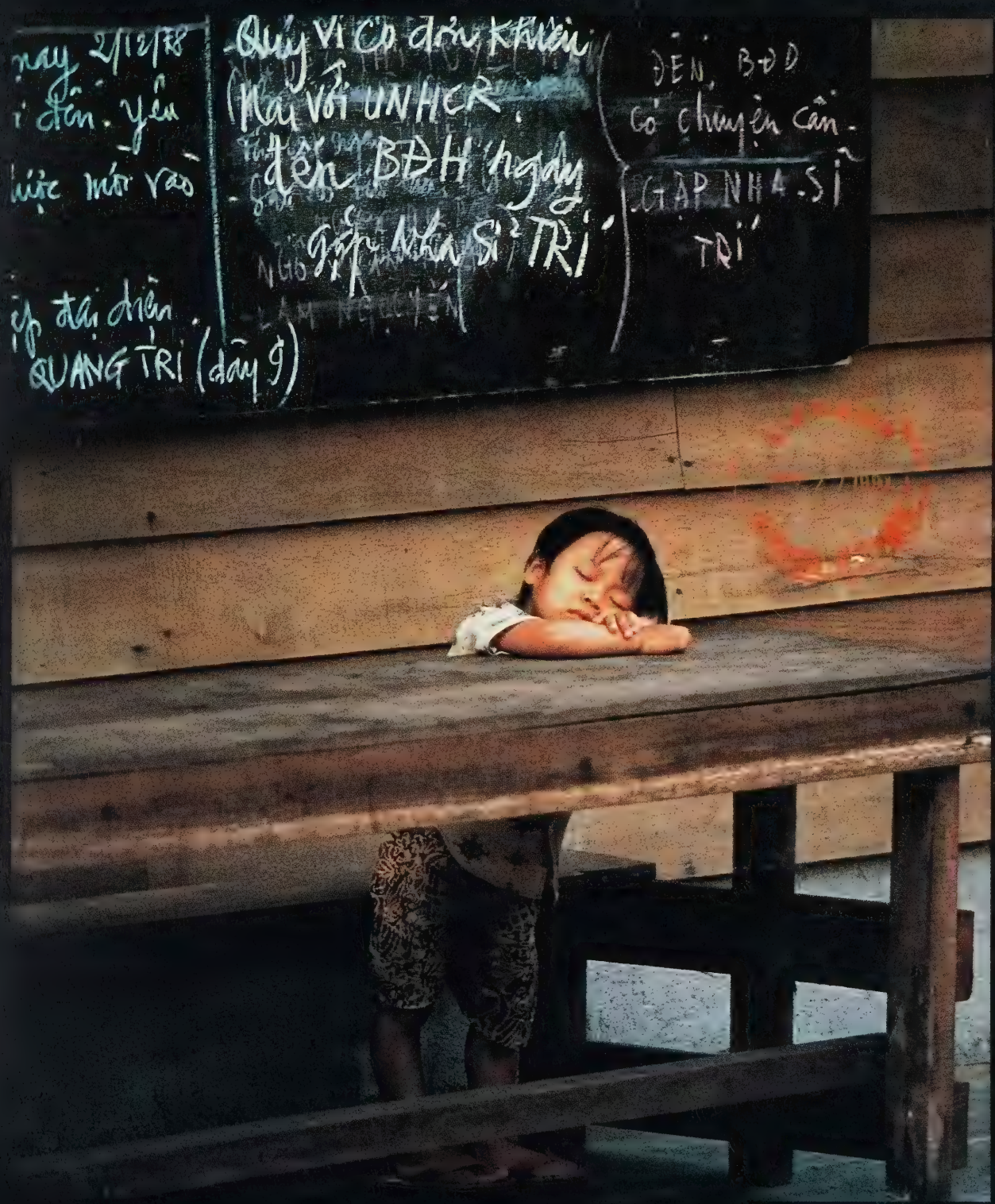
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FOCUS

Yesterday, it was the boat people flooding into Hong Kong harbour that grabbed the attention of the international media. Today, it is the plight of the Kurds in Iraq. Whatever the region, the issue of refugees — of forced migration — is extremely relevant. There are an estimated 15 million refugees in the world, 95% of them in developing countries.

The magnitude of the problem leaves many questions to be answered and much research to be done. Researchers we have met are trying to tackle this challenge head-on. Without denying the necessity of emergency aid, they propose long-term solutions that take into account the sources of forced migration: political and economic injustices, conflicts, and wars. For a long time now, experts have been suggesting concerted action on the part of industrialized countries to help those countries that welcome refugees and to improve living conditions in the countries from which refugees have fled. Given the complexities of the relations between states, these efforts have had only limited results so far.

With ample evidence of overcrowded camps and desperate refugees, how long can we rely on emergency aid and piecemeal solutions? The refugee problem is more than just the result of bad policies in some developing countries; it is also a reflection of the immense political and economic disparities of our world.

Indeed, day after day industrialized countries are affected by refugees as the number of migrants coming to work in the North, or simply seeking peace and security there, is increasing. If only for this reason the issue of refugees deserves the collective effort and attention of researchers in countries around the world.

Editor-in-Chief



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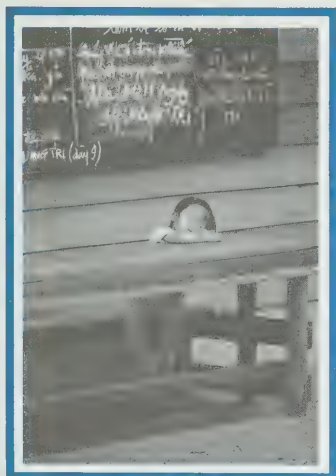
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REFUGEES IN AFRICA IN SEARCH OF HOPE



Refugees must wait for policies to be agreed upon while they face an uncertain future.

The most persistent and dominant image of Africa today is of a continent trapped in famine, wars, conflicts, and underdevelopment. Although recent events in the Horn of Africa have reinforced this image, they have also served to underline the need for African countries to emerge from this situation and come up with practical and lasting solutions to the circumstances that have created more than 5 million refugees and many more displaced persons.

The search for hope among the millions of powerless, uprooted, dispossessed, and hungry of Africa is urgent and persistent. It is a problem that agonizes many, fuelling the current debates on democratization and pluralism in Africa and leading to an intensified search for solutions.

In the past 3 years, conflicts and wars in Ethiopia, Liberia, Mozambique, Rwanda, Somalia, and Sudan have added to the increasing number of refugees in Djibouti, Kenya, Malawi, Zambia, Swaziland, Uganda, Zaire, and Zimbabwe. These refugees pose serious problems to the host countries and relief agencies whose resources are strained to accommodate their needs, particularly those of women and children who form the majority of the refugee population. Although research can highlight the conditions and plight of refugees, and to some extent this has been done, the problem remains an essentially political one and requires a political approach for resolution. First and foremost, the

issue of refugees has to be tackled at this level; it remains one of the most challenging public policy concerns in Africa today. The political leadership of the continent must take full responsibility instead of simply pointing to the old scapegoats of colonial influence and foreign intervention.

Although the heritage of colonial boundaries, policies of divide and rule, and uneven development are the root causes of some of the prevailing conflicts, African states and leaderships share an even bigger responsibility for the emergence and continuation of the wars and conflicts that have plagued the continent and spurred the enormous refugee problem. African leaders have created and supervised undemocratic state structures and processes that have been totally lacking in accountability.

This has led to a disregard for human (and group) rights. Authoritarian states and leaders have suppressed the rights of people to freedom and self-determination; the resultant insecurity and conflicts have created refugee problems and other tragedies. Natural disasters have accelerated these conditions, but the primary responsibility still remains with African leaderships and the policies they have pursued.

The consequences of these man-made and natural disasters on the situation of children, environment, food production, education, health, infrastructure, and the development processes on the whole will be with us for a long time. The African governments and the leadership bear the enormous responsibility for past mistakes, but the international community has an increasing moral duty to work together with the African people as they search for solutions. We should not forget the role played by superpowers, and even the apartheid regime of South

Africa, in encouraging and sustaining some of the wars that have devastated many African countries. They have a moral responsibility for their past involvements. The overriding challenge today is for all concerned to search for hope for the millions of African refugees and displaced persons who for decades have not known peace. They wait in expectation.

Signs of Hope

Although the recent collapse of regimes in Ethiopia and Somalia have created new waves of refugees and internally displaced persons in the Horn of Africa, elsewhere there are signs of hope that the path of reconciliation, dialogue, and peaceful resolution of conflicts is slowly and painfully becoming a recognized mode for resolving long-standing conflicts. The recently signed peace accord between warring factions in Angola and the ongoing negotiations in Mozambique bear witness to this trend. In Africa, there are rays of hope that this might become an established methodology of resolving differences. The real test to this approach is whether it will be accepted in countries like Ethiopia, Liberia, Somalia, and Rwanda.

Other sources of hope are the independence of Namibia, which paved the way for the return of Namibian refugees, and the rapidly changing political climate in South Africa leading to the return of thousands of refugees. These changes have created hope that negotiation as a mode of settling conflicts can work to the benefit of the people — especially women and children, the most vulnerable victims of war. The events that led to the independence of Namibia came from hard work, patience, diplomacy, and resourcefulness. Success was the outcome of this investment.

For the seeds of peace to germinate in the countries and regions now producing the most refugees in Africa, a great deal of effort has to be invested by the African leaders and the people themselves. Once the political leadership has shown willingness to resolve their differences through negotiation and dialogue international agencies can be catalysts and sustainers of these processes. This can, and hopefully will, usher in a new era of peace and development.

The current trend toward pluralism and democracy in Africa, it is hoped, will lead to the emergence of political arrangements that can safeguard the rights of minority groups and individuals, as well as enable the free and full participation of the majority of people in the public institutions of governance. Recent events in countries like Benin and Rwanda seem to indicate that these concerns can create a new consensus between the rulers and the ruled. In elections this year, for example, the people of Benin responded to a grassroots democratic movement by church groups and nongovernmental organizations (NGOs) and kicked out the man who had been leader for 18 years, President Kerekou.

A note of caution, however, needs to be sounded at this juncture; the search for accountability and a pluralistic mode of politics in Africa is not going to be easy. It will be a long, painful, and bumpy journey. The most positive thing in the current situation is that the first steps are being taken



Should refugees be integrated among the host population or isolated in their own camps?

by the people. Although they may not lead to fundamental solutions to the refugee problem, they can nevertheless create a climate for serious and honest debate and, hopefully, actions by policymakers, development agencies, and researchers.

The Role of Researchers

What has been the role of researchers in this situation? Researchers working in this field have raised the visibility of refugees and displaced persons. The international news media has played a crucial role in building awareness of the problem and raising funds for dealing with it, but the task of researchers has been to go behind the news and provide systematic documentation and analysis of the situations where refugees have settled. The impact of the population changes brought by refugee settlements in countries receiving them have brought into focus key issues of land utilization, food production, environment, conflict of cultures, plight of women and children, education, legal framework of protection of refugees, population growth, and other developmental concerns.

The challenge of how to settle refugees — to integrate them among the host population or to isolate them in their own camps — is one of the many policy issues capturing the attention of researchers, research funding agencies, and policymakers.

The conditions of refugees in host countries has not received adequate research attention. IDRC in the last 5 years has been in the forefront in sensitizing researchers, policymakers, and research institutions to the many research needs in this field. IDRC's approach has been not only to build research awareness of the issues, but also to support researchers studying the conditions of refugees, thereby ensuring that the issues are well placed on the agenda of African researchers and policymakers. A network of researchers in Eastern and Southern Africa working on

issues pertaining to refugee problems has been encouraged and supported, in addition to seminars and workshops for the exchange of information on priority research, methodologies of carrying out research, data analysis, and dissemination of research findings.

The most recent seminar dealing with these issues was held at Arusha, Tanzania, in July 1990. It brought together about 40 researchers, NGOs, policymakers, refugee representatives, and donor agencies to deliberate on research findings of the work done under the auspices of IDRC-funded projects. Research findings from IDRC-supported projects in Somalia, Tanzania, Zambia, Botswana, Swaziland, and Lesotho were reported and deliberated upon. This workshop affirmed the role of research in highlighting the conditions of refugees and the need for policy changes and commitment to a search for lasting solutions to the conditions that produce refugees and displaced persons.

An equally important research and policy concern is the impact of large movements of people on the communities and countries that produce refugees. The dislocations that these upheavals cause to social, economic, and physical development urgently require research attention. At the moment, only limited research has addressed these questions.

When peace emerges and reconstruction begins in earnest in these countries, the consequences of armed conflicts will have to be dealt with by researchers, policymakers, and the communities. Research can provide useful data for the process of reconstruction and the time to prepare for that research is well before the cessation of hostilities. As people reconcile themselves to their past enemies, they will in turn have to be reconciled to their environment, their disrupted traditions and culture, and their war-ravaged land. The long-term implications of forced movements of people from their historical homelands have profound consequences to current and future development in all fields. Research can document and raise awareness on these issues, thereby promoting concerted actions and policies.

The resources for this, however, are difficult to come by. Although negotiations for peace will be difficult, making that peace rooted in the African soil will be even more difficult. Researchers and agencies who have worked in the refugee field will need to show new commitment and resolve in the face of prevailing constraints.

The root causes of the wars and conflicts in Africa have received a great deal of research and scholarly attention, but there have been few systematic attempts to address the issue of how these conflicts and wars can be resolved through negotiation, dialogue, and the democratization of the process of development and governance. This is certainly an area that demands more research.

Research analysts need to highlight critical issues in this area for debate and public policy. Building capacity for research in this field should be complemented with the emergence of policymakers who are knowledgeable and skilled in the negotiating and peace making. If conflicts are going to be with us for a long time, and if the magnitude and consequences we have so far witnessed can be mitigated, then we need to prepare ourselves for far-reaching interventions.

The recently concluded conference in Kampala on Security, Peace and Development is a step in the right direction. Containment of conflicts, with their grim consequences, should now become a priority. The question is whether African political leadership is listening and willing to make the painful and hard decisions that this process entails.

In discussing IDRC work in this field, we cannot fail to recognize equally important efforts in this field by others. The pioneering work of the Oxford University Refugees Studies Program (RSP) has done highly commendable work in carrying out priority research and helped in building and strengthening capacity for individual researchers and institutions in Africa. The hallmark of this work must be the demarcation of refugee concerns as a priority research area, encouraging researchers to take it seriously and incorporate those issues into the development research agenda.

An increasing number of researchers in Africa are analyzing issues related to the refugee problem. Indeed, a number of research institutions have shown a serious commitment to incorporating refugee studies into their curricula. The University of Makerere in Uganda and Moi University in Kenya have recently expressed a keen interest in orienting their research programs toward refugee questions. The University of Dar es Salaam in Tanzania has been the base for the Africa Refugee Study Centre for 3 years. The refugee question is also attracting research and scholarly attention in other institutions in West and Southern Africa.

Africa, of course, is not the only developing region with refugee problems. Southeast Asia, Latin America, and the Middle East all carry the human burden of war, underdevelopment, and ethnic rivalry. But African refugees account for roughly half of all refugees in the developing world. The problems faced by the many countries on this continent remain pressing and severe.

There is a great deal of work to be done. The priority at the moment should be to build and strengthen research capacity for researchers and institutions showing interest in refugee issues.

The process of change, however, is at work and now is the time to seize the opportunity and build a firm foundation of hope for the millions of refugees who continue to live in fear and insecurity.

Kabiru Kinyanjui, a regional program officer with IDRC in Kenya



FLEEING THE SHADOW OF WAR

The shadow of war has cast a dark presence over the southern African country of Angola. It is estimated that more than 700,000 people have been killed and 1.5 million displaced from the country because of a civil war that has intensified since 1975.

The war, between two rival factions fighting for political power in Angola, is part of the stale legacy of the Cold War. For years, the Soviet Union, along with Cuba, funnelled money and arms to the ruling Popular Movement for the Liberation of Angola (MPLA), a self-declared Marxist organization, while the United States funded the rebel National Union for the Total Independence of Angola (UNITA) group, characterizing them as "freedom fighters." Incursions into Angola by the armed forces of South Africa caused further instability in the country, particularly in the late 1970s.

For most of the people in Angola, the political infighting and ideological rhetoric remain largely irrelevant. They know only too well, though, the sporadic violence and repression that have plagued their country.

Insecurity has forced many to leave, fleeing to neighbouring countries like Zambia. An IDRC-sponsored project was designed to study how these refugees could best be integrated into Zambian society without causing social disruption.

Project leader, Dr Nsolo Mijere was assisted by four other researchers in looking at the relative merits of refugee self-settlements and government-organized settlements. In all, such aspects as the socioeconomic impact of refugees on host countries, the demographic effects of refugees, the attitudes of refugees and host populations to each other, and the economic costs of refugees in Zambia were examined. Dr Mijere produced a paper called "The Long-Term Impact and Consequences of Two Refugee Settlement Options: The Case of Angolan Refugees in Zambia," which outlined the research results of the project.



Conclusions from the study challenged some commonly held notions about refugee settlements in Africa. The researchers found that "self-settled refugees, both men and women, are much more integrated into the Zambian society than scheme-settled refugees." The study showed that the spontaneous refugee settlements shared the culture of local Zambian communities.

Traditionally, host African countries have set up organized refugee zones to control and monitor migrants from other regions. But Dr Mijere's study suggests this process hinders the abilities of refugees to adapt to their countries of asylum. Self-styled settlements, he and his colleagues argue, are better for both the refugees and the local communities.

Indeed, the host populations "supported the self-settled refugees," whereas those people surrounding the scheme-settled refugees "wanted them to go back home." It was also shown that "the majority of scheme-settled refugees wanted to return to Angola, while the spontaneously settled refugees did not want to go back to their country of origin."

These findings led Dr Mijere and his colleagues to make a series of recommendations on refugee settlements in Zambia. "When the refugees crossed the borders they

were subjected to the United Nations Convention (1951), the Organization of African Unity treaty (1969), and the Zambian Refugee Control Act (1970), which together deny them freedom of movement and residence," Dr Mijere says. He and his colleagues think there should be some changes to the current situation.

They believe that refugees should be "given the option to choose whether they want to be scheme-settled or self-settled." The researchers also urged the Zambian government to amend its Refugee Control Act, which restricts freedom of movement and denies the right of citizenship to refugees. In a key recommendation, Dr Mijere and his fellow researchers suggest that refugees be allowed to apply for citizenship after 10 years of unbroken residence in Zambia. In most African nations, there is little or no legislation regarding the rights of refugees to apply for citizenship in countries of asylum.

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INTEGRATING REFUGEES INTO HOST COUNTRIES

On a hot August day in 1988, the army of Burundi president Pierre Buyoya moved into the small villages of Marangara and Ntega in the northern region of this tiny southern African country. What happened in the following week remains unclear, but eyewitness accounts claim that more than 25,000 peasants — most of them from Hutu ethnic origin — were killed. Those who survived fled to neighbouring countries like Rwanda and Tanzania.

This incident was only one in a troubled history of ethnic conflicts between racial groups in Burundi. The Hutu make up 85% of the population, whereas the Tutsi account for 14%, and the Twa only 1%. Although the Tutsi are a minority of the population, they have controlled the Burundi government for years.

Other incidents, such as the systematic killing of elite Hutu in the army and civil service in 1965 and the severe military crackdown in 1972 by President Micombero that left an estimated 200,000 dead, have fuelled the fires of political instability and led to the exodus of thousands of Burundi citizens. The senseless cycle of war and ethnic violence has left its human burden: refugees.

The problem of refugees in this region is nothing new. But an IDRC-sponsored study has asked some new questions about Burundi refugees in Tanzania and focused on research issues largely ignored in the past. The study, led by project leaders Mr Ayok Chol Anthony and Mr Maurice Mbago, looked at sustainable and durable solutions to the refugee problem in Tanzania.

In particular, they concentrated on the complex issue of refugee integration into host countries. Realizing that repatriation was not an immediately desirable solution, the

project leaders wanted to go beyond temporary measures of humanitarian assistance to examine the prospects of integrating Burundi refugees into Tanzanian society.

"In many cases voluntary repatriation involves discussions with the host country and the country of origin, but it excludes the refugees and neglects the root causes of the exodus," Mr Ayok Chol says. "This is a problem with any prospective Burundi repatriation."

The Burundi refugees, as the researchers point out, are a good case study for the African region. They represent the largest group of refugees in Tanzania; about 71% of refugees living in organized settlements in the country are from Burundi.

With aims similar to the Zambian project leaders, both Mr Ayok Chol and Mr Mbago set out to examine differences between organized refugee settlements and self-settled refugee villages in Tanzania to see if one were more conducive to integration than the other. They picked two planned settlements in Western Tanzania, Katumba and Ulyanku, and selected self-settled villages in the Kigoma region to test their theories of integration.

Mr Ayok Chol and Mr Mbago argued that the "prospects for integrating the Burundi refugees in Tanzania are more promising in self-settlements than in planned settlements."

This reinforces the conclusions of researchers in the Zambian project and draws attention to the need for change in host country settlement patterns of refugees. "In the past, refugees were frequently treated in a punitive way," Mr Ayok Chol says. "There were confinement centres and displaced people were put in either poor economic regions or hardship areas with bad soil conditions." But as Mr Ayok Chol and Mr Mbago show, refugees in self-settlements are often more productive and better adjusted to the host country. "In the future the

emphasis should be put on developing 'spontaneous' or 'self' settlements rather than planned settlements as this facilitates integration," the researchers say.

Mr Ayok Chol and Mr Mbago used various standards to measure whether groups of refugees were integrated into the host country or whether they merely existed on the fringe of that society. Such criteria as social, economic, and cultural or psychological factors were examined to find out how well the refugee settlements were adjusting to the host country.

Social measures of integration such as intermarriage between refugees and citizens of the host country, interpersonal relationships, and education were all found to be more favourable in self-settlements in Tanzania than in planned settlements. "In key areas like intermarriage, we found that the attitudes of the refugees in self-settled villages, as well as those of the local Tanzanian population, to be better than in the planned settlements," Mr Ayok Chol says.

From the evidence, it seems that self-settled refugee villages created a better climate for understanding between refugees and local populations. Indeed, the researchers argue that in areas surrounding self-settled refugee villages the local population appeared to be more tolerant than in planned areas. "It seems that in those villages which have not received assistance the locals are more willing to accept refugees and treat them as citizens than in assisted villages," Mr Ayok Chol says.

Economic integration of refugees was another measure of how well the refugees have adjusted to the host community. Mr Ayok Chol and Mr Mbago used standards like employment and becoming a permanent part of the labour force of the host economy as signs of integration. Although data from this measurement were not conclusive, refugees in self-settled villages generally had higher disposable incomes than the local populations. In terms of employment, many refugees



Prospects for integrating the Burundi refugees in Tanzania are more promising in self-settlements than in planned settlements

in self-settled villages could live in urban areas, whereas those refugees living in planned areas were not allowed to leave the area of settlement because of restrictions of the Tanzanian Refugee Control Act.

Important cultural and psychological conditions among refugees, such as language, religion, and willingness to repatriate back to Burundi, were also measured by the researchers. They found that those in self-settled villages adapted quicker to the requirements of language and religion and had little desire to go back to their home country. Indeed, for these refugees, Mr Ayok Chol recommends legislation to allow them to become Tanzanian citizens. "One of the main recommendations of this project was for Tanzania and other African

countries to create a period of time after which refugees could become citizens," he says. "Right now it is a very open-ended question in most African countries."

For those refugees in planned settlements in Tanzania the research revealed a general desire to go back to Burundi and a dissatisfaction with their lives in Tanzania. In contrast to the self-settled villages, figures from the planned settlements showed that the refugees frequently did not speak local languages. It was also found that the host populations were generally more suspicious and less tolerant of these refugees.

Both Mr Ayok Chol and Mr Mbago argue that, in terms of successful integration of refugees into host communities, self-settled villages should be seen as a positive step. They also stress, however, that self-settlement is not a panacea.

There are still many problems to be addressed. For example, employment schemes for refugees, especially in urban areas, is something Mr Ayok Chol wants to see funded in the future. "If some of the money from assistance agencies were put into job creation it would create many positive developments," he says. "In my view this is one of the missing links."

In addition, there are other factors that can hinder integration and the successful transition of refugees from insecure migrants to productive members of the host country. In particular, state actions and covert treaties can jeopardize the integration of refugees into host countries. "Frequently, states enter into bi-lateral treaties in their own national self-interest," Mr Ayok Chol notes. "In the case of Burundi these treaties have involved attempts to persuade or even cajole refugees to return to their country of origin against their interest."

Despite the hindrances that plague refugees trying to live in host countries, Mr Ayok Chol and Mr Mbago remain cautiously optimistic. "There are no simple catch-all policies to resolve the plight of refugees in Tanzania or, indeed, in all of Africa," Mr Ayok Chol concludes. "But if refugees are consulted and integrated into the host countries through a series of policies this can act as an interim solution to a perplexing problem."

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REFUGEES WAITING IN EXPECTATION



Vietnamese refugees waiting in a Thai camp for resettlement or repatriation: some have lived here for years.

Thailand is currently faced with the daunting task of formulating a new policy for an old problem — refugees. Since 1945, refugees from Vietnam, China, Burma, Laos, and Cambodia have flooded into Thailand, most of them escaping the ravages of this war-torn region.

With more than 100,000 Indochinese refugees in the country today, the Thai government is walking a thin and difficult line between humanitarianism and pragmatic concern for national security.

Throughout the past 13 years, the Thai government has held an unchanging policy toward the refugee problem, allowing for the temporary stay of refugees to await third-country resettlement or repatriation. But both

resettlement and repatriation are complex processes that can take years. In the meantime, Thailand shoulders much of the political, economic, and social burden of refugees.

Thailand offers refuge to more than half of the 190,000 Indochinese migrants in the region. Many are fleeing from warfare and persecution and have little or no chance of being accepted in a third country. These refugees, more than 14,000 of whom are Vietnamese, are classified by the Thai government as "asylum seekers" because their well-being is threatened in their home country. They face the reality of going back to their country as one solution to the problem.

Those who have the prospect of being accepted for resettlement in a third country are referred to as "refugees." More than 75,000 of the migrants under this classification are Laotians and Cambodians. Both the Thai government and the United Nations High Commissioner for

Refugees (UNHCR) agree that the ideal solution to the current refugee problem is voluntary repatriation. Indeed, since 1980 some 7,364 Laotians have willingly returned to their country under UNCHR auspices.

At the international conference on Indochinese refugees held in Geneva in 1989, it was agreed that an additional 496 Laotians and 338 Vietnamese asylum seekers would voluntarily return home from Thailand. By getting most of the Indochinese countries together, this conference also tried to deal with the thorny issues at the root of the refugee situation: the persecution and human rights infringements of various minority groups in countries of origin.

In terms of the total number of refugees in camps in Thailand, those who actually do go back home are few and far between.

One private organization, the Bangkok-based Public Affairs Institute, has been carrying out IDRC-funded policy research to aid the Thai government in its refugee strategy. The work of the Institute has been closely coordinated with the Interior Ministry, responsible for the overall refugee question, and the Supreme Command of the Thai Armed Forces.

"The priority that lies ahead for those looking after the Indochinese refugees is to prepare them to go back," says Professor Somsakdi Xuto, the Director of the Institute. "Our policies must begin to address this issue."

It has become almost impossible to convince refugees to return to their countries of origin, especially in light of the conditions in holding centres that are clearly better than those prevailing in home countries.

The 100,360 refugees and asylum seekers are housed in a number of camps, screening centres, and transit facilities assisted by the UNHCR. The size of these facilities range from the largest, at Ban Vinai camp in Loei province housing 23,820 Laotian hilltribe refugees, to fewer than 100 at the Bangkok Transit Centre. In addition to these refugees living within the country, there are 320,000 Cambodians living on the Thai-Cambodian border, north and south of the eastern Thai town of Anayapathet.

Professor Somsakdi notes that there is no easy way to categorize the refugees' responses to going back to their countries of origin. Although older refugees show willingness to return to their countries, the younger ones want exactly the opposite. With many younger refugees becoming familiar with the relatively high standard of living in Western countries where they seek resettlement, there is little inclination to return home.

This is a key problem for the refugee officials, UNHCR, and those involved in policy research. The bulk of the current refugee population is likely to stay in Thailand for longer periods of time because close to 80% of those living within holding centres are in their 20s.

Lowland Laotians are often sent to Thailand by their elders to seek resettlement in third countries, constituting groups of what are now considered "economic refugees." This influx exacerbates the problems of the current refugee situation.

It is for this reason that the Public Affairs Institute has worked with the Interior Ministry on the screening procedures for refugees at the camps. In particular, research workers from the Institute are helping with training



Children make up a large percentage of refugees — what does the future hold for them?

facilities for the screening process.

"Most Southeast Asian countries of first asylum have not had screening procedures to determine whether the entrants are refugees or not," Professor Somsakdi notes. He says the Public Affairs Institute is cooperating with the Thai government to make sure genuine refugees are given asylum while those seeking economic advantages are screened.

Perhaps the most pressing and typical example of Thai refugees is the one evidenced by the Hmong population coming mainly from Laos. Thai officials view them as a group with almost no chance of being

accepted by third countries for resettlement due largely to low levels of education. Most of the Hmong population are unwilling to return home because of persecution.

When the Hmong first arrived in Thailand they were determined to liberate their country from its communist rulers and return. But, gradually, they have become accustomed to the relatively comfortable conditions in camps. The will to fight and return home has virtually disappeared.

Thailand will likely have to cope with the refugee problem for a long time. Official policy denies the granting of Thai citizenship or permanent residence to refugees. Recently, Thailand did give citizenship to a group of Vietnamese who had fled to the country after the Dien Bien Phu fall of the French, but this gesture was seen as an exception rather than a rule in the case of the current "refugees" and "asylum seekers."

Professor Somsakdi does, however, remain optimistic in the face of recent developments. He believes that the refugee situation has improved in the last few years. "This part of the world is undergoing a big change now," he says. "And with the prospects for peace in Indochina growing strong, we can expect the refugee influx to slow down significantly."

Professor Somsakdi thinks the pressure on Thailand could ease off in the near future now that the country has stopped being the "magnet that earlier drew hundreds of thousands of Indochinese refugees."

Wirasak Salayakanond in Thailand



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THE DISPLACED OF LEBANON



The average length of displacement is 8 years, and 40% of displaced persons have been living in forced exile since 1975.

Lebanon has been at war for more than 15 years and a significant proportion of its citizens have had to leave their homes to escape the fighting.

Many aid organizations working in Lebanon, Lebanese as well as international, have shouldered the responsibility of providing needed assistance. The distribution of food, clothing, and medicine has been regular and relatively efficient.

The displacement that people believed would be temporary, in many cases, became permanent. After several years of war in the early 1980s, displaced people were already the country's greatest problem, one to which no one was capable of responding for lack of appropriate knowledge and understanding of the needs involved.

The Applied Social Sciences Research Institute (Institut d'études en sciences sociales appliquées), formed as a result of cooperation between a group of Lebanese researchers affiliated with the Université St-Joseph in Beirut and researchers at Laval University in Quebec City, thus embarked on a comprehensive study to provide a more accurate picture of the needs of displaced Lebanese to enhance the effectiveness of aid organizations.

The study is being directed by a Lebanese university professor and was made possible by funding from IDRC and the Ford Foundation. Involved in the study are psychologists, social workers, sociologists, geographers, and a demographer.

"Emergency assistance is available," said André Beaudoin, Professor of Social Work at Laval University and a member of the research team. "But after 15 years of war, other needs,

albeit less obvious, have moved to the forefront. There is an acute shortage of resources aimed at helping displaced people organize themselves. It appears that all the aid organizations occupy the same niche — emergency assistance."

The research team has defined four major objectives, each with its own program: to measure the extent and the characteristics of the internal migration; to identify the living conditions of this displaced population; to study the psychological, social, and family impacts; and to identify the most appropriate forms of assistance in the context of reconstruction.

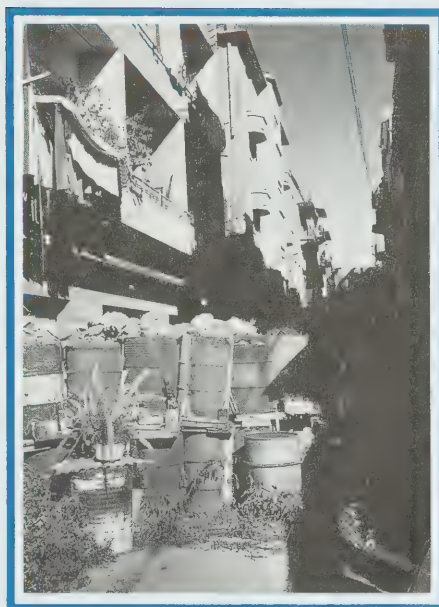
Field research in the social sciences is rarely easy, but when the field in question is Lebanon, the task becomes a great deal more complex. Lebanon has been the arena for many violent clashes and consists of areas that are virtually sealed off from one another.

As a result, it has taken more than 5 years to complete just two of the research programs. There was a lot of ground to cover. Lebanon's most recent population census was in 1932! No one could agree on the number of displaced persons, or on their ethnic origin. Each group, Palestinians, Sunnis, Christians, has its own statistics...not necessarily of unquestionable objectivity. The first study, therefore, took the form of a census of more than 55,000 households, some 10% of Lebanon's population. It found that the number of households displaced by the war ranges from 574,000 to 662,000, out of a total population of between 2.83 and 3.28 million. These results were most revealing: this estimate is today considered by many the most reliable available anywhere in Lebanon.

Contrary to the general belief that East and West Beirut were the primary areas affected by the exodus of their inhabitants, it became clear that all areas of the country had been affected to an almost identical extent. The phenomenon did, nevertheless, affect different social classes differently: farmers, owners of businesses, and tradespeople are much less mobile than employees or professionals. André Beaudoin commented "Such people normally turn their backs on their livelihood only as a last resort."

The study also revealed that, more often than not, temporary moves become permanent. At the time of the survey, the average length of displacement was 8 years and 40% of displaced persons had been living in forced exile since the beginning of the troubles in 1975.

The team then selected 2,000 displaced households, to whom it administered a more comprehensive questionnaire on living conditions. This questionnaire revealed that the wartime conditions did not bring about the disappearance of traditional family assistance. Wherever possible, families forced to settle in a new area were taken in by relatives.



Beirut walls form barriers to research as well as to citizens.

Parallel to this, new, more informal forms of assistance emerged. The various militia, because they controlled the sources of income as well as extensive property, found themselves in a position to distribute jobs and requisitioned housing.

Heads of displaced households, despite fairly long periods of unemployment, generally find work, sometimes under better conditions than those they left behind.

Living conditions for displaced families, nonetheless, remain very difficult, even years later. Some have been living for years in requisitioned motels, many without running water or bathroom facilities.

The third study, which is currently under way, targets the aid organizations directly. The research team's aim is to record the views held by those involved with the problems and needs of displaced persons and define the type of assistance they

provide, where, and to whom. "The results," notes André Beaudoin, "can help the Lebanese to equip themselves with a more effective aid infrastructure than is possible for the existing groups, which suffer from ethnic and cultural compartmentalization and from being concentrated almost exclusively in Beirut." He, nevertheless, admits that the aid groups are somewhat suspicious and do not willingly come forward to answer the questionnaire, which might limit the scope of the findings.

The fourth aspect of the project involves some 30 families who will undergo in-depth interviews. The team hopes to measure the impact of displacement on relationships within the family and on parent-child relationships. Who is the authority figure? What impact does internal exile have on children's progress in school? What relationships do families develop with the militia? The fourth aspect hopes to answer all these questions for the Lebanese and thus sharpen their focus and understanding of their current situation.

The challenging field conditions notwithstanding, the Applied Social Sciences Research Institute hopes to be able to complete this ambitious project within the next few months.

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MODULES MUSHROOM IN THE DESERT

Until recently, effective management of natural resources has not been the primary concern of the Mexican government or of the people living in the arid, semidesert region of northeast Mexico. Today, the disappearance of certain plant species near populated areas has given rise to concern.

The simultaneous growth in population and needs, adverse weather conditions, and, especially, unrestrained exploitation have all endangered these natural resources.

Confronted with this situation, the federal department of agriculture (SARH - Secretaría de Agricultura y Recursos Hidráulicos) has stepped up its research aimed at improving harvesting and extraction techniques to encourage the sustainable use of resources. In carrying out the research, the department has relied on the National Institute for Forest, Agricultural and Fisheries Research (INIFAP-Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias).

As rural families are generally involved in multiple activities such as agriculture, herding, and gathering forest products, SARH, with IDRC support, is testing a system of cultivation that integrates agricultural, forest, and forage products. Called "multiple use modules," the system makes it possible to ensure that the population is self-sufficient in food to maintain and even increase the "campesinos" (peasants) income and to provide enough forage to feed the animals.

For examples of problems that have plagued the people in these regions in the past, Mr Luis Armando Gonzales Leija, the national coordinator of INIFAP, points to the villages of Hipolito and San Cosne, located in the northeastern part of Mexico. These villages are bounded by mountains with chalky soil and lakes and rivers that have dried up. In this semidesert setting, the vegetation, although sparse, is highly varied. Hillsides and

valleys are dotted with dwarf shrubs, stunted palm trees, and cactus. The vegetation consists largely of nonligneous forest products. Free-range cattle, watched by young cowherds, graze on overexploited common land.

In Hipolito, the extraction of "candelilla" wax is the inhabitants' primary source of income. On the outskirts of the village, the campesinos have set up a processing plant where



The harvester uses a metal-ringed pole to break off the plant.



Melchor García Valdez, the researcher on site at San Miguel, Mexico.

the plants, after being harvested and dried, are heated in a pot filled with water and sulphuric acid. The slender shrub can contain up to 5% wax, which is sought after in the manufacture of a wide range of products including chewing gum, glaze for candies, varnishes, paint, floor wax, shoe polish, coating for records, and the wax finish with which fruits and vegetables are coated for preservation and export.

More than 9,500 campesinos living in the Mexican states of Coahuila, Chihuahua, Durango, and Zacatecas, produce candelilla wax. Their output in 1988 was over 3,000 tonnes of wax worth 6 billion Mexican pesos, equivalent to US\$2,400,000. Nearly 30% of the output is for domestic consumption, whereas 70% is exported to the United States and Europe.

Unfortunately, these statistics do not reflect the worry felt by the producers themselves. Does the disappearance of some 150,000 tonnes of candelilla every year jeopardize the plant's existence, as claimed by people who must now travel up to 35 km to gather the plants, now found only in locations increasingly remote from the villages?

"We have reason to believe that this plant species will survive," stresses Mr Leija. "However, the campesinos need to learn to use a tool to cut the stem without damaging the roots. They will have to stop harvesting the plant by pulling the root up with the stem, as they have always done. To pull up the root destroys any hope of regrowth."

Considerable research has been done in recent years to determine harvesting methods that protect regrowth. "Selective pruning is still the best way," says Mr Leija. "This plant takes 3 years to reach maturity. Thus, if only one-third to one-half of the branches are removed each year, this promotes a natural rotation which ensures not only the plant's survival but also a stable, sustainable annual harvest for the wax producers."

In neighbouring San Cosne, the primary source of income for the community's 150 inhabitants is cutting and extracting fibre from the "lechuguilla agave," a plant that grows on flat, well-drained terrain such as that found on gravelly soil.

The lechuguilla agave is harvested by cutting out the heart of the plant whose fleshy leaves extend 20–25 cm in length from the neck of the plant, which has no stem. Except for some villagers who are members of a local cooperative with an electric machine, most of the campesinos still use a finely honed "machete" to scrape the

REPORTS

leaves to remove the fibrous matter that they dry in the sun. To earn a daily wage of 6,000 pesos, a campesino needs to produce about 6 kilos of the fibres, which are used to make brooms, paintbrushes, thread, rope, matting, and sacks. More than 50,000 Mexican families are involved in the production of this fibre, primarily for export.

Once again, the progressive disappearance of this plant in the vicinity of the villages is a crippling blow. The campesinos now travel distances of up to 50 km to gather the amount necessary to earn a decent income. The impact of all this travel on the population is steadily increasing; the campesinos now have less time to spend on farming and, therefore, less money to buy food, seed, and tools. Every drop in production means a loss of income and their families are becoming increasingly impoverished, malnourished, and underfed. This trend has become alarming, especially because it has exacerbated the exodus of men and even families to urban and industrial centres in search of work.

Researchers like Mr Leija hope the module system will help to alter the trend of resource degradation in this region. Within a 20-hectare module there are several parcels of land where different products are cultivated. Agricultural produce such as corn and beans, the campesinos' staple diet, are grown as well as forest plants such as lechuguilla, candelilla, "Yucca carnerosana," and nonligneous shrubs that provide fibres, wax, cooking, and heating fuel. Forage such as "nopal," "costilla de vaca," "saladillo," "halimus," and "maguey" are also grown on the module.

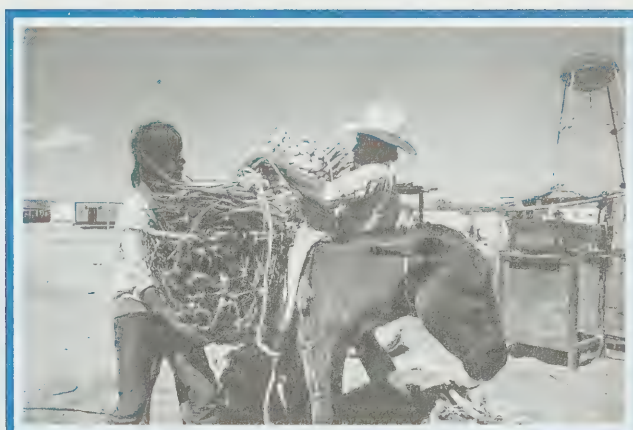
This system is ideally suited to families who rely on subsistence farming. Each family grows the quantity of products that corresponds to its own food requirements. Also, forage production, coupled with the development of enclosed pastures, is an excellent alternative to free-range cattle-raising and overgrazing. It is of enormous help in conserving and protecting vegetables on the overly depleted soils of common land.

A well-developed hectare can contain up to 20,000 lechuguilla or candelilla saplings. A planting of this size near the village means that producers do not have to travel long distances every day and ensures a stable seasonal income and adequate output to meet industry demand.

Is it thus possible to live relatively well in the semi-desert areas of northeastern Mexico? "Of course!", replies Mr Melchor Garcia Valdez, an INIFAP researcher at Saltillo. "The philosophy underlying the modular crop system is to ensure that the campesinos have a seasonal income so they have the time to grow a variety of subsistence and cash crops," he says. "This assures them of an income with which to buy clothing, livestock, farm

tools, seed, or motors. If the ecosystem is respected, if we make it work for us and harvest properly what it produces, it is possible to live on semi-arid land. Even though it's not very fertile, the land is generous. We need only convince the government and the "campesinos" of this."

Denis Marchand in Mexico



Campesinos must travel up to 50 km to gather 70-80 kg of agave, enough to earn a reasonable income.



With traditional processing methods the extract is removed with a sharp knife and left to dry in the sun.



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PLANTING THE PREVENTION OF SCHISTOSOMIASIS



The berries of the Endod plant are helping to control schistosomiasis by killing the snails that host the parasitic disease.

For decades, Zimbabweans used the leaves, roots, and berries of the plant they called gopo (Endod) to make floor polish and medicine. Little did they know that the berries of this climber shrub, scientifically known as *Phytolacca dodecandra*, might one day help to control schistosomiasis disease in their country.

In 1964, a scientist in northern Ethiopia discovered that when tiny amounts of dried Endod berries were crushed and mixed with water, a soapy foam resulted. The solution killed the freshwater snails, which host the schistosomal parasites, within 24 hours.

Dr Aklilu Lemma's discovery and consequent international research are potential breakthroughs for countries like Zimbabwe struggling to combat this water-borne disease.

Researchers at the Ministry of Health's Blair Research Laboratory in Harare are working in partnership with IDRC to study whether they can incorporate Endod treatment into current, community-based schistosomiasis control programs in Zimbabwe's Primary Health Care system. If put into place, these programs will be the first of their kind in any affected region of the world.

Parasites living from host snails are the cause of schistosomiasis. When humans come into contact with contaminated water the parasites, scientifically known as *Schistosoma cercarie*, penetrate the skin. These parasites then develop into worms that pass into the blood vessels of the intestines or bladder.

Mature worms live for 4 or 5 years, producing up to 300 eggs per day and scientists say the more eggs in the body, the more severe the infection.

Blood in urine and stool, diarrhea, fatigue, fever, malnutrition, and decreased immunity are often symptoms of schistosomiasis. The disease has recently been found to

have negative effects on physical and school performance in infested children. In its most severe form, schistosomiasis can result in paralysis and death.

Two million of Zimbabwe's population of 9 million are affected by the disease; a great many others are at risk. After malaria, schistosomiasis is the most common parasitic infection in Zimbabwe.

Schistosomiasis has its highest prevalence in 8–10 year old schoolchildren who frequently come into contact with contaminated water. Open water bodies used for bathing, cooking, laundry, and irrigation — especially in rural areas — serve as breeding grounds for both the snails and the parasites they house.

Since mid-1989, scientists at the Blair Research Laboratory have been cultivating various Endod strains to test which plants will control the disease most effectively. Jerry Ndamba, the project leader of the Endod studies at the Blair laboratory, says future Endod use could

dramatically reduce the incidence of schistosomiasis. It will also, he adds, be a more viable and cost-effective method for Zimbabwe to combat the disease.

"Endod treatment encourages self-initiatives while lessening our dependence on Western technologies," he says. "These technologies are normally out of the reach of most developing countries."

The wild plant Endod could replace more expensive synthetic ways of killing snails, scientifically known as molluscicides. The most popular of these synthetic treatments is a niclosamide ethanolamine salt, called "Bayluscide." Bayluscide is currently the only snail-killing compound recommended for use by the World Health Organization (WHO). But its cost, US\$27,000 per tonne, makes it too expensive for large-scale use by Zimbabwe's Ministry of Health.

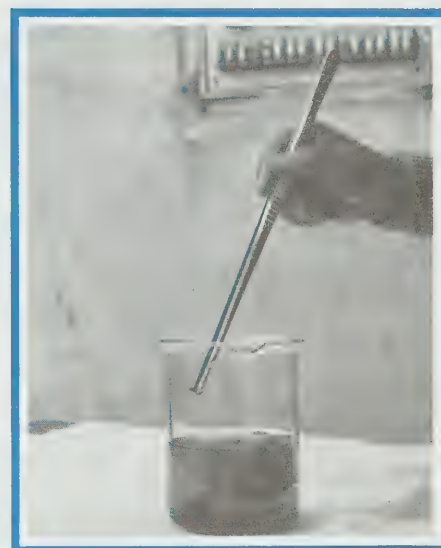
As an alternative, the Blair Research Laboratory is experimenting with different strains of Endod in 9 various regions of Zimbabwe looking at different altitudes, climates, soil types, and precipitation levels. Types of Endod include the Ethiopian strain, E-44, and Zimbabwean strains of Endod grown in the south (Masvingo), the north and the eastern highlands (Old Mutare).

The team is currently determining the conditions under which the strains grow best. To date, indications are that the E-44 strain produces more berries than the local strains, growing best when fertilized with manure and watered regularly.

Studies on E-44 concluded that its berries were most potent to snails when picked at the green, unripe stage and then air-dried in the shade. The dried berries can then be ground to a fine particle and mixed with water to achieve the desired concentration.

The solution is stored for 24 hours at room temperature with occasional stirring. Later, the mixture is filtered through a cotton cloth. The product is finally homogenized and stored at room temperature. A 100% mortality rate occurs when snails carrying the schistosomal parasites are immersed in Endod-treated water at one part per million for 24 hours.

After application to the water, Endod does not remain or build up in the environment like some of the toxic molluscicides. Indeed, before the Endod molluscicide was used in community trials, Canadian laboratories, under the coordination of Carleton University, evaluated its toxicity. Despite its problems as a severe eye irritant, Endod was found to be no more toxic than currently recommended molluscicides. Indeed, tests have shown that use of Endod could be safer than genotoxic niclosamides like Bayluscide.



Laboratory tests have proven the potency of the Endod berry in killing the snails that carry schistosomiasis.

Earlier studies on Endod's environmental effects revealed that it had little impact on plants and animals, with the exception of some fish, aquatic leeches, and insect larvae.

The indigenous plant that grows in Zimbabwe's endemic areas may allow communities to take over snail control once training is given, according to Ndamba. The treatment is easy to prepare using local tools.

"Endod research has forged scientific links and fostered the belief that affected countries have the resource and technology to solve their own problems," Mr Ndamba says.

Communities Involved in Control

If put into place, Endod treatment will allow Zimbabwe's Ministry of Health to involve affected communities in all levels of schistosomiasis control. With funding from IDRC, Blair's research team has already designed and introduced an integrated, community self-help control program since 1985.

The rural communities of Madziwa (32,000 people) and Bushu (8,000) in the country's northeast region are testing-grounds for the control programs that include four components: self-help water and



Changing habits, like refraining from washing in open water bodies, have helped in the fight against the disease.

THE MAN-MADE SIDE OF NATURAL DISASTER

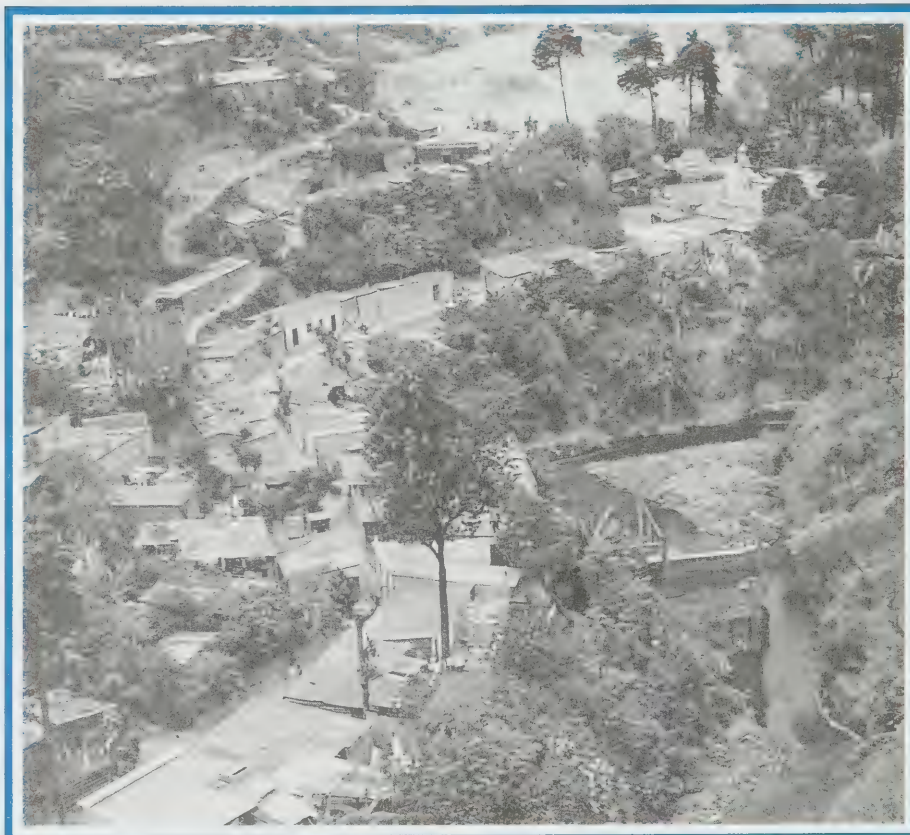
sanitation projects, health education, chemotherapy treatment of schoolchildren through the drug praziquantel, and focused antisnail programs.

The fact that 10 year old Simbarashe Chagadama can cite the causes and symptoms of schistosomiasis, learned from his brother in Form Three of secondary school, is a sign that the health education campaigns have raised awareness of the disease throughout the community. The campaigns involve classes, drama, and song competitions on schistosomiasis control.

Now entering its second phase from 1990 to 1992, the four components of the project will be evaluated by scientists at the Blair laboratory. Endod treatment will allow the final segment, snail control, to be broadened to include community members.

Research is also underway in Canada and the USA to determine whether Endod treatment can be used to kill Zebra mussels currently clogging Canada's Great Lakes drainage systems, illustrating that technology transfers can flow both ways between the North and South. The plant that may save schistosomiasis-afflicted countries could also solve one of Canada's major water problems.

Deborah Carter in Harare, Zimbabwe



In the "Colony of Good Hope" on the outskirts of Guatemala City, this type of housing construction is at high risk in the event of earthquakes.

Fifteen years ago, 23,000 Guatemalans died, more than 100,000 were injured and close to a million were left homeless — all in less than one minute. The force of one of the largest earthquakes ever in this small, poor Central American country devastated the population and left more than a billion dollars in damage.

A similar quake in Nicaragua in 1972 destroyed most of the capital city, another caused havoc in El Salvador in 1985, and Hurricane Joan wiped out homes and lives on the east coast of Nicaragua in 1988.

Like the wars that have put this region in the headlines, the six countries of Central America seem to have more than their share of natural disasters.

Earthquakes, volcanoes, droughts, floods, torrential rains, mudslides, and hurricanes occur here with a frequency unheard of in most other parts of the world.

But the problems of Central America are not solely the fate of nature. In fact, according to Jose Luis Gandara, who headed a research team looking at Guatemala's natural disasters, "the disasters are not natural, but the result of natural phenomena in vulnerable places."

Proof of this point is the fact that the earthquake that hit the major American city of San Francisco in 1989 resulted in fewer than 100 deaths, whereas a similar quake in Central America would likely have left thousands dead. In Central America, the low level of economic diversification, concentrated populations in several high-risk zones,



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the lack of an economic and social infrastructure, and low incomes all add to the probability that a natural phenomenon will become a natural disaster.

Research conducted by a team of Central Americans and Canadians, with funding from IDRC, looked at these problems and attempted to find solutions. Using field research, the study established high-risk zones, assessed the disaster plans of public authorities, and estimated the potential impact of future disasters on the socioeconomic and organizational structures of the countries.

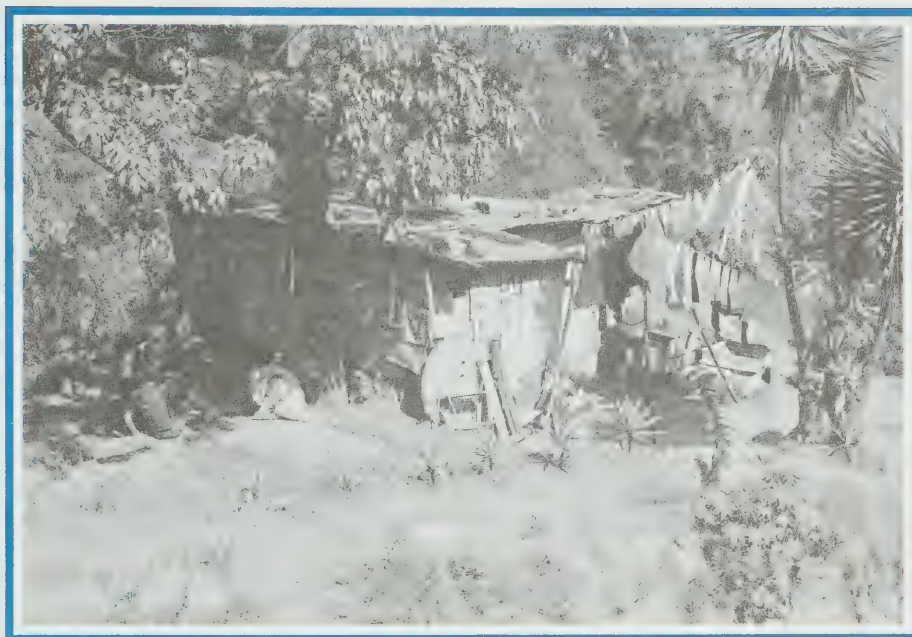
The 17-month project, based in Costa Rica, used the same methodology in each of the participating countries, says project coordinator Allan Lavell of the Consejo Superior Universitario Centroamericano. These countries included Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua.

In Guatemala, Mr Gandara, research director of the faculty of architecture at the University of San Carlos, led a team of professionals, researchers, and graduate students.

Mr Gandara says there are two main problems facing his country in dealing with natural disasters. The first is politicians who are slow to commit money to disaster planning before there is a disaster. "We have problems with the institutions coordinating natural disasters here in Guatemala," he explains. "They don't have a forward-looking vision about the problem. They work only when we have a disaster: we see this problem in all the countries of Central America."

The second problem, Mr Gandara says, is that large numbers of people live in makeshift shacks unable to withstand even mild natural phenomena. "Our people live in poor conditions and their housing is often in bad shape," he says. "Their vulnerability is greater than the vulnerability of those in Canada or the United States."

Like El Salvador, Nicaragua, and Honduras, war and poor economic conditions have pushed many of the rural people of Guatemala into the cities. With only marginal incomes, they squat on the outskirts, building



Poorly constructed "chapas" and adobe housing will not withstand an earthquake, as sadly evidenced by the 23,000 who died in the quakes of 1976.

"champas" from bits of tin and wood, or slightly more durable "adobe" houses from blocks of hardened mud. It is these structures that are the first to collapse with the force of an earthquake, bringing thousands of deaths. Many of these structures collapse with lesser force, in summer rains or mudslides.

"Thirty percent of the people in the main cities are living in these types of shelters or on the sides of inclinations," Mr Gandara says. "They are the most vulnerable."

Before his research team could make any recommendations to public authorities, they had to delve into the history of Guatemala and its natural disasters. They studied every publication, manuscript, and newspaper they could find, searching through the records of the "conquistadors" in Spain and later in the newspaper collections and national archives of Guatemala.

Using this preliminary information, they divided the disasters into three types: geophysical, hydrometeorological, and geodynamic. The researchers then made maps of the country showing the places where the main disasters had taken place.

"We combined this information with the economic production and infrastructures of each region to determine what areas had the highest risks," Mr Gandara explains. "We looked at the relationship between the risks and vulnerability and at what places the poorest people live."

The number one high-risk area is Guatemala City, particularly the northwest section, where tens of thousands live in adobe structures. Other major cities like Antigua, less than an hour's drive from the capital, and Quezaltenango, further northwest, also face high risks.

Some regions like the huge Peten Plateau in northeastern Guatemala are classified as low risk simply because they are more sparsely populated.

No Building Codes

Mr Gandara says these results are not startling but serve as important sources of information for politicians at all levels of government and point out what actions are necessary to protect human life and ensure a minimal impact on the country's economy.

But in Guatemala — and the rest of Central America — much more is needed than an assessment of high-risk zones, Mr Gandara says. His team found little in the way of laws



and regulations that would minimize the risks. There is, for example, no building code and no agency responsible for ensuring that construction is safe and resistant to earthquakes.

The research team is calling for stronger laws and regulations to prevent disasters or at least to mitigate their effects. They would like to see a government agency created to set and monitor building codes.

The researchers also want a national plan drawn up identifying the zones of high, medium, and low risk that would include the density of population and the economic activities and services of each region.

Mr Gandara says there must be some links between all organizations doing emergency preparation work and these groups should include public participation. In addition, he recommends a coordinated emergency plan that would include the evacuation of buildings, the provision of medical services, and the education of people on what they should do following a natural disaster.

"The public sector must be coordinated to prevent and mitigate disasters and avoid the duplication of functions," Mr Gandara contends. "Organizations must reverse their roles and work towards prevention, instead of simply waiting to respond."

He believes less than US\$50,000 a year is spent on disaster planning even though millions have been lost from natural disasters in the last 20 years alone. His team has urged the government to reassign money and spend more on prevention.

Environmental protections are also needed, including a program to prevent an environmental disaster after a natural phenomenon occurs. The study also recommends that an inventory should be taken of all the resources in the country that could help develop a prevention program and monitor natural disasters.

In Guatemala, Mr Gandara's research team is using the results of the study to lobby politicians and make them aware of the long-term implications of natural disasters.

Already, he has a partial commitment from the mayor of Guatemala City to develop an emergency plan for the city that could ultimately save thousands of lives. Newspapers and television stations have taken up the cause publicizing the study's results and urging political leaders to commit themselves to an emergency preparedness program.

"We are trying to create a consciousness in the people who make the decisions that they can improve the situation," Mr Gandara says. "We want them to know about the risks and the potential solutions."

Kim Bolan with photographer Moriss Castillo in Central America



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To call the situation facing Laotian development officials frustrating would be an understatement. These officials were eager to address the many health, nutritional, educational, and industrial development problems facing their tiny, landlocked country — one of the poorest in the world. They had a library of 13,000 scientific and technical books to help them do it.

But the books were in French and English, with a few in Russian. These were of little use to any but a handful of senior technocrats who had the good fortune to be educated overseas in one of these languages.

Scientific and technical literature are an essential part of the infrastructure that supports development in a country. Without access to this literature, many of the developments taken for granted by the rest of the world just passed Laos by.

"Information is the lifeblood of science," says Paul McConnell of IDRC's information sciences division. "When a country is attempting to build up its capacity in science and technology one of the first places to begin is by strengthening the information infrastructure."

That is why IDRC's willingness in 1987 to fund the acquisition of literature in Thai was welcomed with enthusiasm at the Laotian Ministry of Science and Technology. The Lao language is similar enough to Thai that the new books could be used by a much wider spectrum of the country's 4 million people. This was IDRC's first project in Laos.

Although the Centre National de Documentation et d'Information Scientifique et Technologique (CNDIST), which was responsible for the project, started off with only modest resources, it did have a plan for developing its services. With IDRC support, it was able to convert this plan into action. Initially, this meant

DEVELOPING IN THEIR OWN LANGUAGE

some basic things like proper lighting at the centre's premises in a former USAID building. Another portion of the money had to go toward training in photocopier maintenance.

There were also significant signs of success in acquiring and disseminating information. By the end of the project in 1989, more than 7,000 new volumes of scientific material and 20, 3-year periodical subscriptions were obtained by the centre.

Actual use of the CNDIST library increased almost 10-fold after the IDRC project. The centre now has 600 members, compared to fewer than 100 before the project. These figures do not include members of the public who use the library but do not borrow books.

Through dealing with Thai literature and interacting with more users, the CNDIST staff has learned valuable lessons in information management. The project has enabled the centre to establish contacts with key research institutions and documentation centres in Thailand, like Kasetsart University and the Asian Institute of Technology.

During three book-buying trips to Bangkok, Laotian officials were guided by their government's economic plan, which stresses the development of the country's agriculture, small-scale manufacturing, and services. They brought back everything from rice-planting manuals to volumes filled with pesticide data, from rattan-processing guides to information on how to set up a small ceramics business.

Many Laotian government agencies have their own specialized libraries on these individual subjects, but the IDRC project resulted in the first, comprehensive interdisciplinary collection of science and technology literature. As such, CNDIST contains information on topics like environmental conservation or remote sensing that would otherwise fall through the cracks of bureaucratic specialization.

"Even the decision-makers call on us now," says Moukh Savanh, the current director of the centre. "Many government ministers are now our members."



The library now has more than 7,000 new volumes of scientific material.

It is important that the centre not just collect information but disseminate it to as many levels of society as possible, Mr Savanh adds. To increase awareness, advertisements are regularly published in the local newspaper about what literature is available. More comprehensive lists of about 1,000 titles are occasionally distributed to researchers and development workers nationwide.

IDRC's project also included training in information packaging at the Bangkok-based Asian Institute of Technology. In early 1991, the centre experimented with a quarterly, mimeographed scientific review for specialists. The journal carries news on recent developments in the field of science and technology relevant to Laos. The centre is also planning weekly articles on new developments

in science and technology to be published in the local newspaper. Mr Savanh also speaks of a need to set up data bases on research and development in Laos.

"Right now there is a great deal of information in Laos, but it is not centralized and, therefore, not easy to find," he says. "We have to organize some kind of national network."

"Our ministry's goal is to coordinate and supervise research and technology transfers at the national level," Mr Savanh explains. "If people need information, they now know they have our centre."

Mark Timm in Vientiane, Laos



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MAKING FOOD NUTRITIOUS: SOYBEAN IN NIGERIA

Five years ago, farmers in the small Nigerian village community of Ijaiye thought little of soybean as a crop. In 1986, only 17% of them cultivated the protein-rich grain. For these and other Nigerian farmers, however, the times have changed and an IDRC-funded project called "Soybean Utilization" has helped to make this change a lasting one.

The farming, marketing, and eating of soybean have become important aspects in this West African country's fight against hunger. Researchers with the project estimate that in the Benue state of Nigeria the number of soybean-growing farmers and the total volume of crop produced have both increased fivefold since 1986. In Ijaiye, surveys have shown that more than half of the farmers currently produce soybean.

Despite the fact that some northern communities have grown soya since 1908, few Nigerians actually used soybean in their diet when the project began in 1986. Researchers pointed to poor knowledge, lack of appropriate technology, or unavailability of seed as key reasons for this neglect.

But Nigerians have quickly realized the advantages of this grain. Soybean fits many of the protein requirements of the West African people. Its grain is very rich in protein (40%) and its oil (20%) is highly nutritious. In a country where meat consumption is limited for cost reasons, there is a great need for alternative sources of protein. Soybean has roughly the same amount of protein as dried fish, but a kilogram of fish sells for about 90 Naira (US\$10,) whereas soybean can be bought for two Naira (US\$0.20 cents) per kilogram.

The main research for the project is being done by the International Institute of Tropical Agriculture (IITA) and the Institute of Agricultural Research and Training (IAR&T). One of their essential goals has been to introduce and promote protein-rich soybean products.

Dr S.R. Singh, a scientist with IITA, says that a key challenge of the research "was to come up with foods which suited local diets, improved the



nutrition of local dishes yet did not change the taste of those dishes nor increase their cost."

Although the initial targets for this promotion of soybean use were primarily women, children, and rural farmers, all Nigerians are beginning to realize the nutritional importance of soybean. Surveys conducted by project researchers in the Oyo State region show that in the last 5 years the number of people eating soybean has risen from near zero to 54%.

A major success has been found in "gari," the traditional food for millions of Nigerians. Gari is a paste or gruel made from fermented cassava, a starchy root crop with almost no protein. Researchers at IITA and IAR&T have developed "soygari," a cassava-and-soy mixture that tastes the same and has 10–20 times more protein than traditional gari.

There are other success stories like soy "milk," soy vegetable soup, soy ogi, and soy iru dawadawa. The milk, made from soy flour, can be prepared in the home in less than 15 minutes, as compared to earlier methods that involved overnight soaking then boiling and grinding of soybean. Similarly, a survey done by project researchers on Nigerian people's eating habits showed foods like soy vegetable soup were used very frequently because they were easy to prepare.

In the short term, children and nursing mothers have benefited greatly from the creation of protein-rich baby foods like "soyamusa" and "babeena." Many hospitals and women's group programs in Nigeria are promoting soybeans in their campaign to raise family and children's nutrition levels.

In addition to research on soybean and the traditional Nigerian diet, the project has also tried to develop improved soybean utilization

technology for use in households and in small-scale processing enterprises in rural Nigeria. Simple and inexpensive machinery, like soybean oil screw presses, have been introduced as a result of the project. Several of these locally manufactured screw presses are in use in various parts of Nigeria.

The impact of the project has been felt not only in the rural communities but in urban centres as well. In Ibadan, Nigeria's largest city after the commercial capital of Lagos, retailers dealing in soybeans have increased in number from 4 in 1987 to 236 in 1989. There are more than 15 food-processing manufacturers making various food products from soybeans for household consumption. Many of these products were developed in collaboration with the IDRC project.



A sampling of the variety and versatility of soybean products.

Surveys show that in the last 5 years the number of people eating soybean has risen from near zero to 54%.

Soybean research and its implications for increased nutrition levels among the Nigerian people has had a strong impact on the government. The Nigerian government knows well the recent history of its agricultural situation.

When the oil boom came in the 1970s, Nigeria, with plentiful oil supplies, had an abundant foreign exchange. It quickly began to import much of its food, neglecting its domestic agricultural base. But when the price of crude oil dropped, so did Nigeria's ability to import essential protein-rich food commodities. The country could not afford to import food nor could its inadequate agricultural production feed its people. Malnourishment — particularly protein deficiency — has been the unfortunate result.

The people of Nigeria, like those of several other African countries, have struggled under the unforgiving grip of malnutrition throughout the 1980s and into the 1990s. Typically, the hardest hit have been low-income groups, women, and children. One recent UNICEF report estimated that one in five children in Nigeria are malnourished.

The long-term goals of the soybean project in Nigeria are not only to increase nutrition in all sectors of the population but to promote the grain in other African countries with suitable growing conditions. Indeed, this project in Nigeria is having an impact in other countries as well. The Ghanaian government has sent observers to report on the potential of soybean and the possibility of increasing its use in Ghana.

As a crucial alternative source of protein, soybean is beginning to make its mark in Africa.

Craig Harris



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Pamphlet: "Soybeans for Good Health: How to Grow and Use Soybeans in Nigeria."
Published by IITA
Oyo Road, PMB 5320
Ibadan, Nigeria
Price: Free



A VILLAGE CONTROLLING ITS OWN DESTINY

The elders of the small Mexican village of Cheranatzicurin talk of the vast, beautiful pine and oak forests that once covered the hillsides and valleys filled with wheat, barley, hay, and corn.

Looking at the region from the town, perched at an altitude of more than 2,000 metres on the slopes of an extinct volcano, it is difficult to believe this kind of vegetation once existed here.

Now the area seems to be perpetually shrouded in dust. Drinking water is growing scarce, farmland has eroded and become infertile, forests have disappeared. Today, even the species called "ciromo," which was common to the area, is becoming extinct. Forests, which it was believed would last forever, have given way to vast, barren tracts.

Gone with the forests are also the seemingly endless supply of fuelwood for energy.

For years, this community had little in the way of forest-management techniques. Wood consumption was characterized by indiscriminate cutting, illegal burning, diseased forests, and the uncontrolled clearing of farmland.

For want of tools and adequate transportation, people left tree trunks behind and removed only the branches they could carry with them. At night, professional loggers arrived, sometimes from far away, well-protected by armed guards and well-equipped to cut down the finest oaks that sell to building contractors. Illegal logging continues to ravage the forest.

Harvesting "ciromo," which is in demand by furniture makers, musical instrument makers, and sculptors, is an important source of income for the "campesinos" (peasants). But it didn't occur to anyone to reforest this species, which is on the way to extinction. Much of the regional economy is dependent on selling handicrafts and now faces a threat equivalent to that facing the ecosystem.

Chronic shortages of wood today are

Navia, the project coordinator. "In order to slow down environmental degradation, the community must take over the project and take charge of its own development."

The formation of a forest surveillance committee is concrete evidence of the growing awareness of this situation. Patrols crisscross the nearby forest to detect tree diseases, fire hazards, identify areas for reforestation, and sensitize forest users

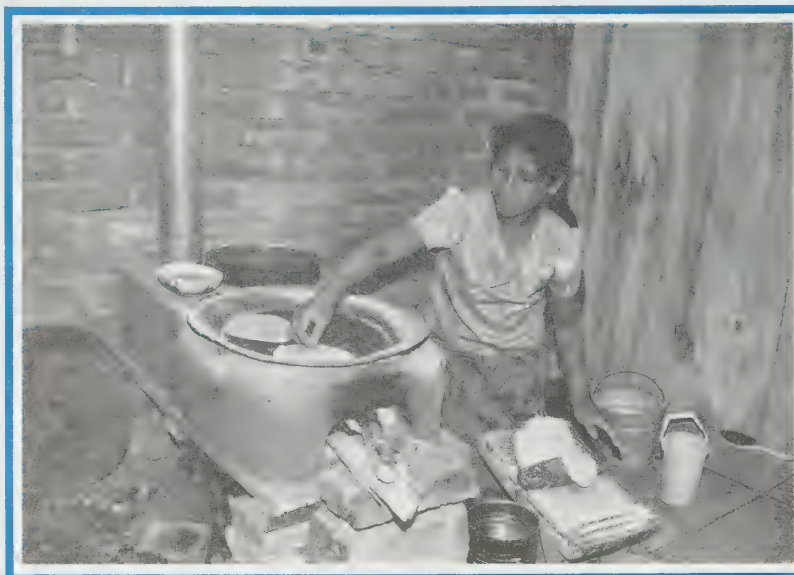
to the necessity of using wood sparingly and of replanting a tree for each one that is cut. The patrols also meet with campesinos who are tempted to practice slash-and-burn agriculture. To date, 17 species of trees have been identified and are being reproduced in CRETA's seed nursery.

The committee disseminates information through broadcasts over a local radio station and publishes extension pamphlets, these consist mostly of pictures as the majority

of the population is illiterate. Above all, however, it holds meetings of small groups of people and uses word of mouth to reach the villagers.

Much of the project's research was aimed at developing a profile of the population's energy consumption, identifying its needs and problems, and proposing technological innovations. The study revealed that traditional cooking systems were quite inefficient.

To remedy this situation, CRETA looked toward developing a new type of stove for village use. CRETA borrowed the design of a stove, called Lorena, from Guatemala but made several modifications to it. It burns less than half the wood consumed by the "three-stone" stoves. Fifty-eight stoves were built the first year, accounting for



only exacerbated by increasing population growth in the area.

An IDRC-funded project carried out by the Regional Centre for Appropriate Technology (CRETA—Centro Regional de Tecnologías Apropriadas) is trying to infuse resource management techniques into the village of Cheranatzicurin. CRETA was founded by the Grupo Interdisciplinario de Tecnología Rural Apropiada (GIRA), is currently funded by the Grupos Universitarios Interdisciplinarios (GUI), and was set up in the wake of research done by the Universidad Autónoma de México.

"True natural resource management depends on the recognition, by all members of a community, of the importance and the limits of the resources used," points out Jaime

REPORTS

"They needed some guidance so they could participate in the changes."



This modified "Lorena" stove under construction burns less than half the wood consumed by traditional means.

15% of households. Although the number has grown steadily since then, a great deal remains to be done as wood still provides 86% of energy needs.

Recently, a group of village women was invited to the house of Roselio Joaquin to learn how to work the stove that Roselio had built in his kitchen. While Maria boiled hot water for coffee and cooking, her daughter Rosanna mixed and rolled out the corn dough with a stone and cooked the tortillas. There was no irritating smoke in the kitchen and it was not overly hot. One hot plate was used for cooking tortillas, another for boiling hot water, and a third for keeping food hot. The food cooked quickly and Maria claimed the tortillas had better flavour. The smoke escaped through an efficient chimney.

After breakfast, the women watched a video showing how the stove was built. Then, convinced, they gathered up the rudimentary tools and building materials (nails, planks, sand, clay, and water) needed to build stoves in their own kitchens. They generally do a fairly good job with this work,

especially because they have the support of CRETA members and the young people of the village who have decided to specialize in building better stoves.

"Preservation of natural resources, forest conservation, better food, nutrition, are now part of their language and their concerns," says Margarita Carrillo Ruiz, a member of the staff at CRETA. "These women are aware that community participation is essential to the social and economic development of the village as a whole. They have always got together to solve the village's problems while their husbands were away."

CRETA acts as a source of knowledge and direction. "One of the problems was that the issues of forest management and energy waste were too abstract for many people to grasp," recounts Roselio Joaquin. "They needed some guidance so they could participate in the changes." Most of the inhabitants of Cheranatzicurin are descendants of the Purepecha Indian tribe and are often poor and illiterate.

Community participation was facilitated by integrating members of the community in the project and by the founding of CRETA.

"We must be patient," explains Jaime Navia, "we cannot change in a single year the behaviour and mentality passed down from generation to generation. These people, like people everywhere, are hesitant to change their habits. But we are beginning to see some signs of change."

With CRETA's help, the people of the village of Cheranatzicurin are becoming more knowledgeable and acting as influential agents of development in the region's other villages.

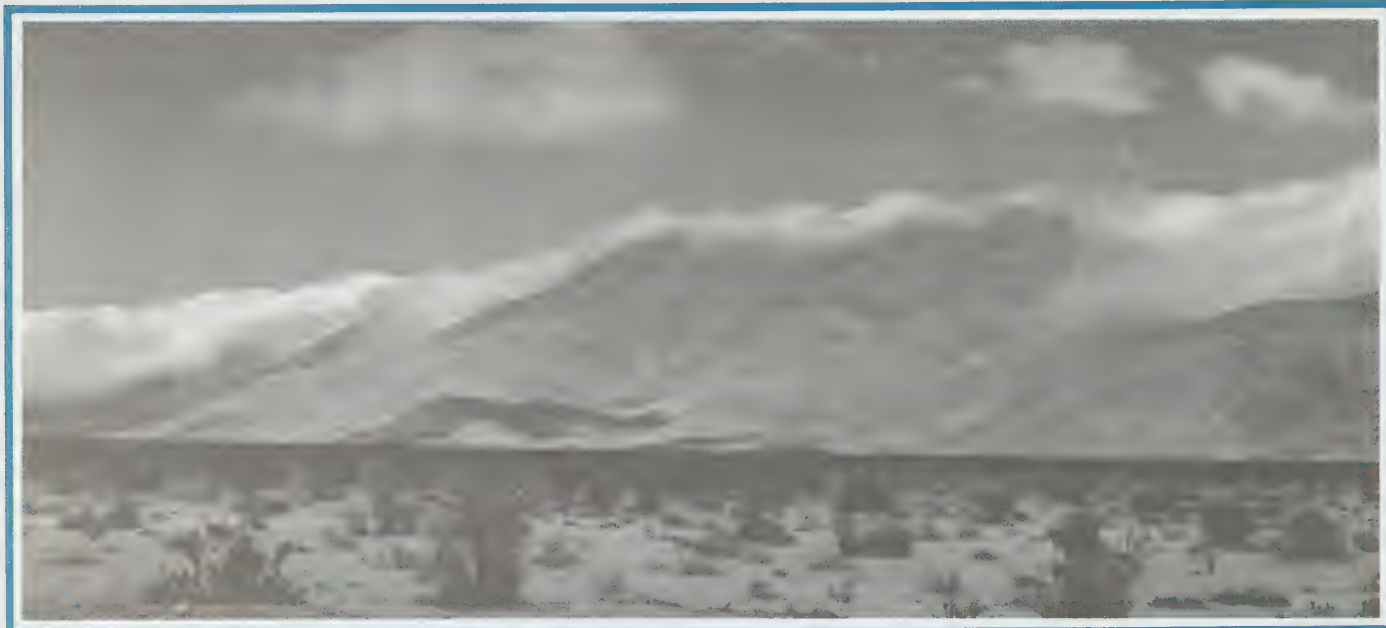
Denis Marchand in Mexico



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CLOUDS IN THE DESERT



Cloud-harvesting technology could bring water to many arid regions of the developing world.

Although the Atacama Desert in northern Chile is one of the world's most arid regions, the coastal clouds that brush the peaks of the Andes on the Pacific Coast — the "camanchacas" — are laden with moisture just waiting to be collected.

Since 1984, this challenge has captured the attention of Pilar Cereceda of the Institute of Geography at the Pontificia Universidad Católica de Chile and Waldo Canto of the Corporación Nacional Forestal. They have worked in collaboration with Robert Schemenauer of Canada's Department of the Environment.

Fifty captors that look like volleyball nets intercept the drops of water from the clouds. Gutters suspended a metre off the ground underneath the 4 x 12 metre nets recover the water before channelling it into a 100,000 litre tank; from there it flows through an aqueduct, currently under construction, to the seaside village of Caleta Chungungo.

Pilar Cereceda, the project coordinator at the Chilean university, and Robert Schemenauer of Environment Canada's Cloud Physics Research Division cannot conceal their enthusiasm when they describe the impact of this type of project on development. The availability of potable fresh water will soon radically change the development parameters of this village and its 330 inhabitants

whose water supply up to now has been delivered once a week by tanker truck — with the empty tank being used to transport villagers on the return journey. Thanks to the water, a tree plantation has flourished on 3 ha of desert for the past several years, and a new plantation of exotic tree species adapted to arid regions is scheduled to take root this year.



Like volleyball nets, the captors intercept the drops of water from the clouds.



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As part of the project, the captors in use will be optimized to generate increased output at lower cost. Pilar Cereceda is also studying potential sites for an additional 25 captors.

The advent of the water will transform this little village from dependence on the outside world into a centre of self-sufficient activity. The existing 50 nets produce 7,200 litres of fresh water daily. The villagers have planted 70 lemon trees (one for each family) and plan to irrigate small vegetable gardens. They are eagerly looking forward to the time when fresh water will be available in sufficient quantities to establish a small artisanal fish and seafood processing plant where they can wash and freeze their catch.



The existing 50 nets produce 7,200 litres of fresh water daily.

International Workshop

For the moment, the El Tofo site, where the captors are located, and the village of Chungungo, 70 km north of La Serena, are only pilot projects. Additional sites are needed, both on the Chilean coast and in other countries with similar climatic conditions. IDRC is particularly interested in disseminating this simple, low-maintenance technology more widely in several areas of the developing world. It is especially appropriate for countries such as Cape Verde, China, Ecuador, Haiti, Peru, Namibia, Yemen, and Oman. The Sultanate of Oman has shown the

way: for centuries, water from the coastal clouds in this desert region has been captured by the leaves of olive trees, where it drips into little tanks built at the foot.

Pilar Cereceda and Robert Schemenauer are at work on a program for an international workshop including a visit to the El Tofo site and technical presentations on the technology involved. Some 50 participants are expected at El Tofo, a score of them from South America.

This international workshop, scheduled for 1992, is intended primarily for representatives of countries involved in water management, nongovernmental organizations working in developing countries, and representatives of the private sector with a potential interest in this technology. In addition to the technical aspect (water supplies), the workshop will focus on the socioeconomic aspects (the range of potential uses). Further information on the workshop and brochures on the project can be obtained from the researchers at the addresses below.

Robert Charbonneau in Chile



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IN BRIEF

New President for IDRC



Dr Keith A. Bezanson brings to IDRC a wealth of experience in the field of international development, both with nongovernmental organizations and within the federal public service.

A graduate of the International Development Education Centre of Stanford University, Dr Bezanson joined the Canadian International Development Agency (CIDA) in 1973. He was appointed Vice-President of the Americas Branch in 1981. In 1985, he served as Canada's Ambassador to Peru and Bolivia. Since 1988, he has been on a tour of duty with the Inter-American Development Bank in Washington as Administrative Manager responsible for the Bank's human and physical resources. Dr Bezanson assumed his new position as president on 29 April 1991.

Prize Winning Pumps

Professor Goh Sing Yau of the Engineering Faculty of the University of Malaya was chosen as one of the two recipients of the Tun Abdul Razak Award for his contributions to developing communities through research and development.

The award, named after the second prime minister of Malaysia, is granted once every 2 years to Malaysians who have made valuable contributions to their country.

Prof. Goh was recognized for his contribution to the development of the unique UNIMADE-IDRC Handpump. The PVC handpump, which is relatively inexpensive, is easily built using locally available material and is repairable by the community without outside assistance.

NATURE & RESOURCES

UNESCO's quarterly review of research for sustainable development has been relaunched in a well-illustrated format and with a carefully refocused editorial policy.

NATURE & RESOURCES is designed to valorize the use of scientific information in the decision-making process affecting the environment. It provides in-depth reviews of contemporary environmental issues from an international perspective thanks to its reliance on both established and new authors from around the world.

Future issues of **NATURE & RESOURCES** will strive to maintain the scientific reputation that it has gained since first appearing in 1965. Its style and distribution have been improved to ensure that the results of research on sustainable development are communicated more effectively to people in a position to use them.

The goal is to provide the latest information on environment and development by taking advantage of the transdisciplinary, international and cross-cultural opportunities of UNESCO's mandate for education, science and culture.

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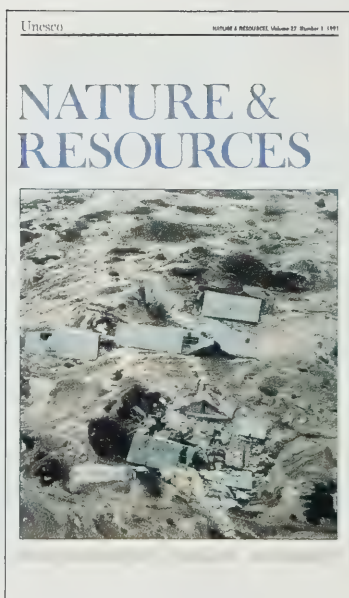
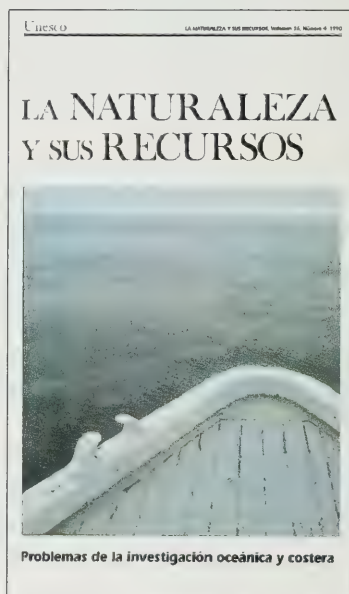
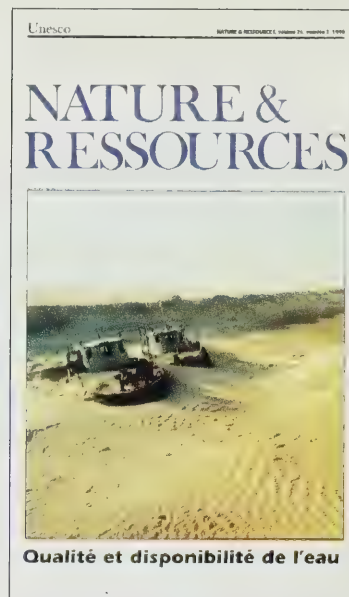
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**Children:
Agents of Change**

CANADA

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F O C U S

One of the keys to development for many Third World countries lies in an obvious but frequently unacknowledged resource — their children. With population rates soaring in many developing regions it is the children who often bear the brunt of poverty, inadequate shelter, malnutrition, and poor social services. Despite, or perhaps because of, market-based adjustment programs, most countries have not seen marked improvements in the standard of living for their children — indeed, in some cases there has been a decline.

This issue focuses on some of the projects IDRC is sponsoring to integrate children into development. An underlying concept in all of these projects is that children should no longer be passive players in the development process but instead should be cast more in the role of participants. The child-to-child approach, for example, reveals what was overlooked in past efforts to improve the lot of children — that children are often the active communicators in the household and community and they can serve as messengers, educators, and implementers for a variety of health and educational programs.

There is another common goal in these projects — that investing in the education and betterment of children is an investment in a country's future. If policymakers and international agencies realize this and replace rhetoric with action, the process of even and equitable development can perhaps begin in earnest.

Editor-in-Chief

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Cover photo : Peter Bennett



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AGENTS OF CHANGE: CHILDREN IN DEVELOPMENT

As we enter the 21st century, renewed attempts are being made worldwide to recognize the central role that children play in international development. These efforts stand against the backdrop of past failures. Most indicators show that the world has failed to provide large numbers of children with the basic conditions necessary to achieve full human development and to lead productive lives. Nowhere is this more evident than in developing countries.

The 1980s have brought about the disturbing realization that economic growth and social modernization in many Third World countries have not yet engendered the changes in attitudes and practices necessary to recognize children as an important part of the development process. Conventional efforts to respond to children's essential needs have too often been costly in their implementation, inefficient in their delivery, and inappropriately suited to people's demands at the grass-roots level.

Traditional attempts to provide for children have frequently focused on improving children's basic health, nutrition, shelter, and education on a sectoral basis to secure minimal conditions for physical survival. Many of these efforts spring from welfare or remedial notions that attempt to compensate for the inadequacies of the social systems in place in many countries. In essence, governments of many developing countries have relied on weak social safety nets.

Children today remain one of the most vulnerable social groups to the failures and contradictions of governments' policies and actions. Narrowly defined strategies to mitigate children's suffering still lead to relief interventions, simplistic aid programs, and poorly designed innovations. Children continue to be passive depositories of social assistance rather than dynamic agents of change.

Statistics on underdevelopment only give a glimpse of the dramatic impact of poverty on children's lives. Today, millions of children are condemned to live in conditions of extreme poverty, malnutrition, ill health, illiteracy, and total exclusion from the benefits of economic growth. One out of three children in the developing world — about 180 million of them — suffers from serious malnutrition. Most are in countries that could be food

Almost 3 million children die every year from a lack of basic health care, most from preventable diseases and poor delivery of services. More than 100 million children of primary school age are not in school, 60 million of which are girls. An estimated 40% of the children who began school in 1990 will drop out before completing a minimum of 4 years of education that at most will qualify them to enlarge the files of the informal sector.

While children's conditions of life deteriorate, the developing world devotes half of its total annual expenditures to maintaining military forces and servicing debts — totalling more than US\$325 billion by the end of the 1980s. Debt and interest payments from the Third to the industrialized world are three times as much as the aid received and results in a net outflow of capital to the northern

hemisphere of more than US\$20 billion a year. This amount is sufficient to cover the human expenditures per capita of all children living in poverty for the first 5 years of their lives.

When international financial institutions reduced their aid flows, increased aid conditionality, and pressured Third World countries to limit state social spending programs for poverty alleviation, infant death rates increased 25% in the countries most heavily in debt. Most governments in Africa, Latin America

and the poorest countries of Asia are allocating less today to social programs than they did in the mid 70s. In this period, government spending in education in developing countries has dropped by almost 3% compared to the early 70s. Spending per head in schools declined by almost 25% in the 37 poorest countries of the world.



self-sufficient but must sell their food in the international market to cope with their debt payments. In 1989, Unicef estimated that in a period of 12 months half a million children die in the developing world as a direct result of slowdowns or reversals in economic development.

Entangled in Their Own Interpretations

Although the figures showing the fate of children are staggering, some international organizations and donor agencies, entangled in their own interpretations of the world, continue to doubt the value of education as a distinct strategic development concern and, instead, shift priorities toward more politically profitable areas of research. Official development aid for basic services such as education dropped by about 6.5% between the 1970s and the 1980s.

Efforts to address children's basic learning needs remain narrowly concentrated in the provision of primary schooling. Early childhood development between birth and 6 years of age and the fate of children after they complete basic education remain peripheral issues among many international donors. Although evidence shows that a 1% increase in female literacy is three times more effective in reducing infant mortality than a similar increase in the number of doctors, women's education has still not been fully achieved.

Despite these overwhelming statistics, efforts to improve the life of children do not necessarily or exclusively mean more money. Instead, the issues often involve political participation, empowerment, and well-informed decisions. Greater equality in resource distribution, a stronger knowledge base for this distribution of resources, and the political will to allocate resources fairly are all part of meeting the demands of people at the grass-roots level. National and international decision-makers must realize that programs which are not culturally appropriate will likely fail. Externally designed visions of the world cannot remain as the driving force in the allocation of resources for human development.

Experiences in low-income developing countries show that essential maternal and child health services can be made available at a cost of US\$5 per person per year. The most common health needs of the poor can be met by community health workers whose training may cost



Economic growth and social modernization in many Third World countries have still not created the changes necessary to recognize children as an important part of the development process.

between 120 and 600 times less than the training of a fully qualified doctor. Experiences in education suggest that the cost of primary school for all 6–11 year olds works out to an average cost of US\$25 per child per year. Piped water supply and basic sanitation can be made available for an annual US\$6 per person. If these estimates are correct, the question emerges: what factors continue to prevent donors and governments in recipient countries from ensuring appropriate conditions for the development of children?

A combination of factors point to some reasons: a lack of sound policy decisions, the predominance of market-based structural adjustment programs, and a lack of basic conditions for the participation and empowerment of the poor in decision-making. With the breakdown of prevailing models of development, there is today an urgent need to revisit the basic notions and assumptions guiding the ways in which societies and the international community see the role of children in development.

The understanding of a child's development as an integral, permanent, and interactive process requiring multidimensional approaches to problem-solving is only recently becoming a reality. Efforts to empower local schools and parents and to involve children in their own human development still reflect the comfortable rhetoric of international politics rather than the urgency of satisfying basic human needs. Notions of community participation and empowerment still rest on global and simplistic understandings of the relations of power in societies where decisions in politics and economics are reserved for the privileged few.

Initiatives Proven to Work

If child development is hampered by shrinking world resources, how can development decisions result in low-cost innovations and equitable solutions to the perennial problems affecting children?

The answer perhaps can be found in experiences that have been proven to work. Although they cannot be presented as building blocks of success, research initiatives supported by IDRC in developing countries over the last two decades reveal creative

alternatives and solutions designed by developing countries themselves. Applied research, when used to empower people to seek low-cost solutions to their own problems, plays a key role in building the knowledge base necessary to better children's lives. For policymakers and educators it can also contribute to developing reliable indicators, achieving low-cost methods for data gathering and analysis, and finding improved ways of accessing this information. But, above all, research can indicate to donors, relief organizations, and policymakers what programs and innovations work in the most cost-effective and culturally appropriate manner.

A feature common to IDRC-related research experiences is their focus on the children themselves as agents of their education and as potential actors in development. In these projects, there is a shared assumption: when children and communities play an active role in their own social well-being, tangible and effective results often follow. The child-centred approach, however, requires moving beyond strategies that rest on narrowly defined programs of social assistance or naive perceptions of popular political participation.

Some preconditions are required for these types of innovations to succeed. They must be developed on the basis of an understanding of the learning patterns of children, the factors influencing their lives, the roles they play in their families, and the social and cultural values that may prevent or facilitate the involvement of children in becoming agents of change. As such, any projects must be driven by multisectoral and multidisciplinary views of human development. Right from the planning stage, there must also be means for monitoring and evaluation to identify areas of success and failure quickly. Finally, every project must be realistic in its assessment about the tangible power of change that participatory and community-based approaches may have vis-à-vis the role of existing institutions in the civil society and at

the state level. If these preconditions are met, effective political actions can be taken to facilitate the success of child-centred innovations and programs.

Specific Projects

Researchers with Aga Khan Foundation projects in India have shown how health education programs have raised not only children's awareness of the benefits of correct hygiene behaviour in the household but also that of siblings and parents. This "child-to-child" approach is a cost-effective innovation geared toward teaching children better health, nutrition, and child development practices. The lesson of the approach is simple: child-centred and participatory activities can, in many cases, promote learning more effectively than traditional educational methods.

The direct involvement of poor, disadvantaged children in providing information about the conditions affecting them most has also proven to be an effective tool in integrating children into the development process. Low-cost and easy-to-handle information bases can make the delivery and monitoring of social services easier and more efficient. Firsthand, readily available data on conditions that facilitate or hamper the effectiveness of children's health, nutrition or education programs is one area requiring primary research attention. The project in Uruguay with the Inter-American Children's Institute is a step forward in bridging this gap.

Understanding the way in which traditional knowledge and indigenous cultural practices affect early childhood development can lead to the production of simple educational tools and materials for use by the family and in preschool settings. The Colombian Centre of Research and Child Development, CIDIE, investigated traditional education practices in Andean countries with the aim of developing an alternative approach to nonformal education. The outcome was a guide with a compilation of children's games adapted to stimulate cognitive, affective, and motor development of preschool-age children from peasant

and indigenous communities. Understanding the factors that cause families to view young children as an integral part of their income-earning strategies, can also help teachers and school authorities to review their assumptions about children's achievements and failures in primary education.

One project in particular reveals the beneficial effects of the organized involvement of the family and the community in children's education. An innovation developed in Chile by the Centre for the Study and Services of Children and Women, CEANIM, shows that communities, working in collaboration with preschool teachers, can be an effective agent in the organization, management, and delivery of preschool programs. This project has led to the establishment of community-based preschools in marginal urban areas run by members of the children's families.

The common characteristic of all these projects is that they place children at the centre of their own development and view children as a means to influence the behaviours and attitudes of their households and communities. Ultimately, these experiences show that children are the key to their own education and development.

Daniel Morales-Gomez, Associate Director of Social Sciences with IDRC.



FROM CHILD TO CHILD

The care of younger children by their older siblings is a common sight throughout the developing world. Millions of children are left on their own for much of the day as both parents often work to make ends meet.

In recent years a new approach to child education, called Child-to-Child, has been trying to turn this harsh reality into an opportunity. The aim is to train young child-minders as health messengers.

"We find that parents don't share information as much as children do," says Indu Capoor, executive director of the Centre for Health, Training and Nutrition Awareness, which provides training and assistance to groups implementing Child-to-Child programs in India. "A child shares the message and awareness very quickly because they are always talking, playing or dancing."

The Child-to-Child approach, although already in use in several countries, was given a name in 1979 — the International Year of the Child — by a group of health and education professionals. Today, the approach is being practiced in more than 70 countries.

The ultimate goal of this approach is for children to reach out to the entire family and community, making it a healthier environment for all who live there. Another guiding principle of the Child-to-Child approach is child-centred, or active, learning. This runs counter to the practice of education in many countries of the world where children still learn passively, by rote.

The approach assumes that children will retain and pass on information effectively if they are encouraged to discover its meaning and importance themselves. This applies to other subjects as well, not just health. Indeed, many educators see this innovation as a way of bringing active learning "through the back door" into schools that still use traditional teaching methods.



The Child-to-Child active learning approach assumes that children will pass on information effectively if they are encouraged to discover its meaning and importance themselves.

Beyond this general principle of active learning, advocates of Child-to-Child have tried to avoid pushing preconceived notions of how the concept should actually be applied. Although the Institute of Child Health in London collects and shares information on various projects around the world, the assumption is that those living in a given cultural milieu are best able to adapt the approach to local conditions.

This flexibility has certainly been partly responsible for the Child-to-Child movement's vitality and popularity, but it also has meant that there have been few systematic attempts to analyze what, in fact, the approach can accomplish. Although a 1981 survey concluded that more than 1.5 million children were involved in Child-to-Child programs worldwide, most assessments of impact have been anecdotal and lacking in hard data.

The Aga Khan Foundation, with funding from IDRC and the Canadian International Development Agency (CIDA), has made an attempt to fill this gap. Over the last 4 years it has supported, evaluated, and compared a cluster of seven very different Child-to-Child projects in India. This unique experiment has just recently concluded, yielding results that could be of interest to educators in India and in the dozens of countries where the approach is used.

The diversity of the projects offered an unprecedented opportunity to evaluate the potential and constraints of the Child-to-Child projects, which consisted of a variety of settings, scales, methods, program content, and target groups.

The Mobile Creche project, for instance, runs 19 educational centres in Bombay for the children of migrant construction workers. On a typical construction site, several dozen workers (men and women) live in miserable conditions with their children.

"While their parents are busy working to provide income, the children are left to fend for themselves," says Dr Indu Balagobal, executive director of the Mobile Creche project. "Children are usually seen wandering around the building site, older siblings carrying younger ones on their hips. They are burdened with responsibility of caring for the younger sibling." It makes sense, therefore, to target these children.

Classrooms at these sites are makeshift: a temporary shelter of sheet metal and wood, or perhaps a half-completed apartment. Activity-based learning about hygiene, safe water, measles, and other health issues is integrated into the teaching of other topics, such as literacy and numeracy. The centre accepts children between the ages of one month and 12 years; children normally attend for about 6 months before the family moves to another construction site.

The New Delhi Municipal Corporation provides a distinctly different setting in a lower, middle-class suburb of the capital. Although the facilities are better, teachers face the usual challenges of overcrowded classrooms, low salaries, and minimal supervision and encouragement. Through a range of action-oriented activities, students here practice simple rules of health, hygiene, and nutrition. This project represents the first attempt in India to use the Child-to-Child approach in a large, government-maintained school system. Beginning in 32 schools in 1987, the project expanded to 108 in 1990.

A similar project at the Aga Khan Education Service Boys and Girls Schools in Bombay, used the Child-to-Child approach to cover various health-related topics: diarrhea, burns, and eye care.

The Malvani Child-to-Child project began in a health clinic in a community of resettled slum dwellers in Bombay, supported by a local medical college. From the beginning, this project placed emphasis on identifying primary school students who could act as "minidoctors" to assist the health centre in reaching out to the community. The children diagnose basic conditions such as scabies, a skin rash prevalent in unsanitary areas, and mobilize the community for immunization campaigns. The minidoctors have also conducted health surveys and hundreds of Oral Rehydration Therapy demonstrations.

Finally, the Foundation selected three, Child-to-Child projects for primary school children in rural Rajasthan and Gujarat. In each case, the local nongovernmental organization (NGO) was given training and technical support by the Centre for Health Education and Nutrition Awareness.

A key question the Aga Khan Foundation and IDRC wanted to answer was if these projects were successful in meeting their goals. Three evaluation teams followed the progress of the various projects over 3 years.

In terms of increasing health awareness of both children and teachers, the evaluations found that all the projects achieved positive results. A number of lessons can be gleaned from a comparison of the Indian Child-to-Child initiatives.

- **Schools are good settings for Child-to-Child projects.**

The formal school system allows access to large numbers of children and provides a "captive audience." Schools allow others to view the project, whether in the form of visiting health workers or the setting up of experimental programs. They are also highly valued and respected in the community. By comparison, outreach from health clinics can be costly, requiring an infrastructure that frequently does not exist.

- **Teacher training must be a priority.**

Experiences in India suggest that too little thought was given to training, particularly in terms of follow-up. No matter how much teachers may learn from a 5-day course, most will not be able to follow through unless they are given additional training material and regular meetings with others. If possible, more than one teacher at a school should be trained in this approach so they can share



The formal school system allows access to large numbers of children and are good settings for Child-to-Child initiatives.



Learning the Child-to-Child way can help to increase health awareness.

experiences. If the school has only one teacher (as is the case in many rural areas of the developing world) then regular supervision and encouragement are needed.

- **Administrative support is critical.**

When the total organization is behind the effort, Child-to-Child is more readily accepted than when teachers are more or less on their own. The support of heads of schools and central administrators is often a large factor in getting programs off the ground. It is also important to try to involve as many staff in the decision-making process as possible.

- **It is difficult to change teaching methods.**

The evaluations showed that teaching styles, for the most part, did not become child-centred simply because of the introduction of the Child-to-Child approach. Teachers are most likely to teach in the way they have been taught. If teachers were lectured to or expected to copy notes and memorize information that is not directly linked to their experiences, they are likely to pass on knowledge in the same way. To make the

child-centred approach more effective, greater emphasis must be placed on the development of appropriate pre- and in-service training for teachers.

- **Locally made teaching materials are best.**

Although mass-produced Child-to-Child activity sheets were useful as models, it was most effective to have teachers create new activity sheets in training workshops. This was a good way to get teachers to understand their role in Child-to-Child projects and to become committed to the approach.

- **Child-to-Child should be integrated into the official curriculum.**

A great difficulty with all the projects was the unwillingness of teachers to give time to Child-to-Child activities if the topics covered were not part of the regular syllabus. Using an active learning approach can also take more time. On the important and serious subject of diarrhea, for example, what used to take less than one period of teaching by traditional textbook methods can take up to eight periods in a Child-to-Child class, as it did in the Bombay primary schools. Although the child-centred approach may be more effective, teachers are often under pressure to complete the

syllabus no matter what. A key strategy then is to ensure that the Child-to-Child approach is fully and realistically incorporated into existing programs.

- **A recognized authority may be necessary to back up the information children are passing on.**

In rural areas, parents more readily accepted the information their children passed on but, in the cities, there was more scepticism. In the Malvani project, the "minidoctors" initially became discouraged when no one would listen to them. But after a health professional visited the village and confirmed what the children were saying, parents began listening to the children. The authority can vary. In central Bombay, educational television programs play a similar role in reinforcing health messages sent by children.

These conclusions stem from various projects in India, but they can apply to individual Child-to-Child projects worldwide. As such, there is the hope that this innovative approach can promote learning and help countries meet national objectives on health awareness and education.

In India, there is now an official recognition of the value of active learning. The Indian government has asked all teachers to devote 30% of class time to child-centred learning activities. For many teachers, however, this is next to impossible as they have received little if any training. Child-to-Child could be the natural answer for administrators looking for ways to introduce new ways of teaching into the classrooms.

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MOTHERS AT SCHOOL

A program developed in poor areas of Santiago, Chile, integrating mothers into kindergarten classes as education facilitators, has proved to be an efficient alternative in preparing children to meet the demands of formal schooling.

In Chile, as elsewhere in the Third World, failure at school is common among the poorest sectors of society and becomes a vicious circle that traps children in poverty and illiteracy.

Trying to remedy this situation, the Centro de Estudios y Atención del Nio y la Mujer (CEANIM), a Chilean nongovernmental organization (NGO), launched a project in 1981 enabling children from poor areas of Santiago to adapt to formal education with some chance of success. This experiment has now been operating for 10 years and involves a preschool education system that encourages mothers to be participants in their children's education.

The process is derived from alternative theories to preschool education developed in the 1960s and was begun by CEANIM during the darkest days of the military government that ruled Chile in the 1970s and 1980s — a time when the impact of repression and the economic crisis on the poorest classes was particularly severe.

CEANIM is an NGO founded in 1979. Its mission is to provide an impetus to preschool education using low-cost methods and drawing on the community's own financial and human resources. Community preschool care centres, known as Centros Comunitarios de Atención Preescolar (CCAP), were created with facilities provided by the Catholic Church and funding from international organizations.

The centres are based on the theory developed by the founders, CEANIM's team of specialists led by psychologist Dr María Angélica Kotliarenco, that each educational centre's success is directly dependent on the work of the mothers involved in its management, operation, and administration. "The educational results of the preschool centres are impressive," Dr Kotliarenco says. "It is an urgent task to try and bridge the gulf between formal and nonformal schooling. I believe that this is one way in which we can lower the failure and dropout rates in elementary schools."

The centres' methodology involves volunteer work by the mothers in their children's educational process. They train for this by attending personal development workshops where they learn about socialization, health, hygiene, and diet.



Ten years into the CEANIM project, 15 centres are now in operation under the direction of mothers as "education facilitators."

The system also requires that the mothers themselves operate their centres. During a centre's first year of operation it is run by CEANIM experts; in its second year, responsibility is shared by the mothers and the experts; and, for the third and subsequent years, it is headed by mother-educators who have distinguished themselves by their work, judgment, and leadership. Ten years into the project, there are now 15 centres in operation under the direction of mothers designated as "education facilitators." CEANIM's team of experts is responsible only for training and ongoing supervision.

Dr Kotliarenco says the preschool education process for children from extremely poor backgrounds achieves more favourable results when mothers are involved in the classroom. Studies carried out with IDRC funding show that these children are able to enter formal education under conditions that are more favourable to the teaching-learning and adjustment processes so fundamental to success at school.

Better Results

"Our research has demonstrated that children whose mothers play a role in the kindergarten achieve markedly better results," Dr Kotliarenco says. "Measurements comparing a group of children from traditional kindergartens with a group from one of our preschool centres, using children with similar potential for intellectual development, show that our children scored much higher in terms of preparation for the school system."

Mothers in the preschool centres also seemed to find many advantages in this alternative to the traditional education system.

Many said they had difficulty in obtaining access to institutional kindergartens in Santiago, for which demand exceeds supply. The fact that the CEANIM centres are located within their communities and in the immediate vicinity of their homes makes them all the more convenient and accessible.

They also pointed out the low cost factor: in addition to their obligatory period of duty once a week in the kindergarten, each mother had to bring cleaning supplies only once a month.

Other advantages they mentioned included the opportunity to participate in the care of their children. Mothers found this infinitely preferable to the formal system where, they said in effect, "you don't know what they teach or how they treat your child."

"In addition to being here with the children, we also learn to educate ourselves along with them," says Lorena Pacheco Caceres, a young mother in the Cardenal Caro CCAP, located in one of metropolitan Santiago's poorest and most deprived slums.

Most mothers said that this type of system provides them with a great sense of personal fulfillment and development. They acquired new knowledge about children and have sustained higher levels of communication with their children at home.

"We learn in another way and grow along with them," adds Mrs Caceres. "We discover many things that we were not aware of before, in terms of caring for and educating our children. We also learn about health, education, and proper diet as well as how to get along with the other mothers and we develop greater self-confidence."

Despite the success of the various preschool centres in Santiago, Dr Kotliarenco says there is still much work to be done. "The biggest challenge for us, and indeed for all of Latin America, is how to ensure that the kindergarten, the home, and the formal education system converge," she says. "Up to now each has operated independently, with disastrous results for poor children."

Since the change of government in Chile, educational authorities are for the first time becoming receptive to these "unconventional methods." CEANIM, for its part, has branched out in other directions, introducing the CCAP experiment to other sectors of society with varying degrees of success.

"This project does not produce results in all sectors of society: you have to be very careful in choosing the sector and type of mother with whom you are going to work, and what incentives you are going to provide them," says Dr Kotliarenco. "The mothers have to be from the lower classes and they have to feel part of their social group. Apart from all this, the basic requirement needed if this project is to produce results is that the mothers have boundless confidence in their potential to truly educate their children."

Richard Vera in Chile.



Top: Leonor Oyarzun, the wife of the President of the Republic, Patricio Aylwin, gives public recognition to the CEANIM centres in a visit to one of the community preschools. Bottom: The mothers also learn about health, education, and proper diet for their children at the centres.



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LOST CHILDREN

The developing world is a world of children, as the saying goes. But what kind of world is it? Poverty, large families, precarious housing, hunger, and hours spent working the streets are the lot of a great many young people in developing countries.

When society takes these children in for protection, to help them get established and reoriented, its resources are often limited and inadequate. That is why an organization based in Uruguay has devoted its efforts over the years to increasing knowledge of children's living conditions and the resources available to them. L'Instituto Interamericano del Niño (IIN), was founded in 1927, under a resolution passed by the Organization of American States.

Thanks in part to the efforts of IDRC, the Interamerican Information Program on Childhood and the Family (IIPCF/PINFA) is now computerized. The data base provides politicians, institutions, researchers, and planners throughout Latin America with access

to the latest research studies and their findings as they affect the region's children. This information is statistical, legal, or sociological in nature, or it may involve studies on health services, education, or drug abuse. The data base includes more than 18,000 bibliographical references, recent papers, and studies (including 420 periodicals) and serves more than 1,625 users in a great many countries in the Americas, Europe, and even in Asia. In addition to its headquarters in Montevideo, Uruguay, the IIPCF has local centres in Argentina, Colombia, Costa Rica, and Ecuador.

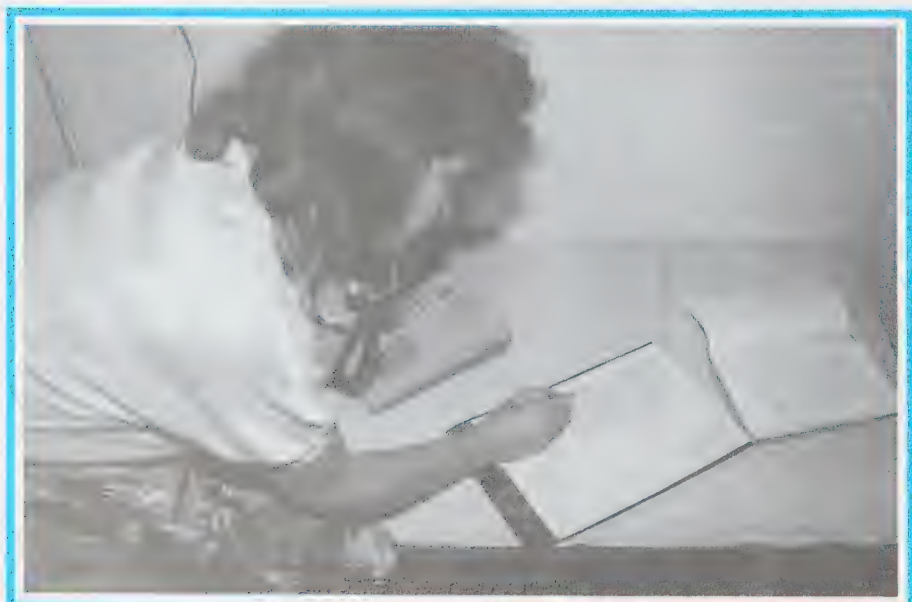
Each centre has qualified librarians and computer technicians to respond to the heavy volume of requests, between 300 and 400 a month. When a catalogue of new listings is published, the number of requests can peak at 1,000 a month. The data bank enables documents to be located in French, Spanish, English, and even Portuguese. Moreover, in addition to Paraguay, Brazil will soon join the list of documentation centres specializing in children.

This, however, is only one aspect of IIN's work in Uruguay. The Institute has been associated since 1989 with INAME, the Instituto nacional del menor, the national governmental children's aid agency, in setting up SIPI, an information system for the protection of children. INAME controls and administers all establishments that provide government services to children. It is responsible for some 7,000 children referred to it by the court or social services agencies, children who have been abandoned, mistreated, found, or adopted. These are children who need to be placed in a wide range of institutions (daycare, rehabilitation centres) or who require treatment by specialists (such as psychologists or psychiatrists) or counselling of some kind.

In the past, the system used at INAME had become overburdened by increasing requests for information. Sometimes, records of children who had been taken under the wing of the Institute were lost. For example, no one could say for sure whether a particular child had run away for the first or second time, or whether the child had been referred to a counsellor, or what conclusions a specialist had reached.

INAME, in cooperation with IIN, launched a pilot project in the spring of 1989 to develop a set of universal indicators for use by children's aid institutes throughout the region. Numerous institutes in a variety of countries (Argentina, Brazil, Costa Rica, Ecuador, Jamaica, and Peru) were approached to evaluate the list of indicators produced. "We wanted," explained systems analyst Rosario Vera, "to ensure from the outset that the system would meet the expectations of all Latin American institutes and subsequently be adopted."

The project included a survey of the forms in use, the design of new computer forms and methods, and a user evaluation (for doctors as well as the institutions' technical and administrative personnel) to avoid problems in practice. "Today, we work more with the administrative



Crèches, daycare and rehabilitation centres phone INAME every day at a specific time to send information on client movements.

These systems will provide vital statistical data on children



The data base provides politicians, institutions, researchers, and planners throughout Latin America with access to the latest research studies and their findings as they affect the region's children.

personnel in charge of operations," Vera said. "They are the ones who enter the data and who were trained to manage the system." Three microcomputers linked by telephone have been installed at INAME. Satellite institutions (such as crèches, daycare and rehabilitation centres) phone INAME every day at a specific time to send information on client movements over the past 24 hours.

All information on clients is now catalogued, although only one-third of the data entries are covered by the pilot project. A total of about 25 institutions are involved in the project and pass on data regularly to the children's aid admission centre. "The

advantage of our system," explained Vera, "is that the data structure we developed is universal and independent of the institutes' administrative structures."

Julio Max Rosenblatt, the project leader, is currently negotiating with the Brazilian and Ecuadorian governments to set up the information system in both countries and anticipates IDRC support for the program in Ecuador.

By developing a single, flexible computer system that is compatible with all institutes in the region, and by continuous consultation from the system design phase onward, IDRC, INAME in Uruguay, and the IIN throughout the region have supported the creation of new resources to help children in Latin America. Not only will these systems enable the institutes to

provide more effective assistance to children, they will also constitute a mine of statistical data vital to everyone — whether researchers or field workers — involved in the welfare of young people.

Robert Charbonneau in Uruguay.



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CHILD'S PLAY

Computers in the classroom can be a powerful instrument in the quest for knowledge, just as they can be frustrating machines for those who do not know how to work them. As educators say, if you want to use computers to learn you have to learn how to use them.

This issue, however, is not that clear-cut in developing countries. The primary obstacle to the effective use of personal computers in the classroom remains the lack of software and teaching materials in native languages. Most computer programs are designed only for European or North American cultures.

"The only way of successfully using computers to reduce the educational gap between urban and rural areas, privileged and underprivileged groups, native and nonnative populations is to have access to culturally appropriate programs," says Carlos A. Rojas of the Instituto SER de Investigación, a research institute in Bogotá, Colombia.

Mr Rojas speaks with the authority of the expert. Since 1984 he has been involved in the use of personal computers as a classroom teaching aid. "Popular belief holds that children from an underprivileged environment remain undereducated because they leave school after 2 or 3 years to start work," he says. "In my country, however, teachers have noticed that children in rural areas leave school because they have too much difficulty acquiring a basic knowledge of Spanish or mathematics. That's where computers can be a valuable tool for both teachers and students."

With funding from IDRC and the British Council, Mr Rojas directed an initial pilot project in Colombia to assess the effects of computer technology on creativity, self-image, and receptivity to academic subjects among children in small rural schools in the Nemocón area. The first

experiments were done on a small scale with the least expensive computer equipment available on the market at the time (Atari computers) and with software designed in English.

Although the introduction of computers to the classroom enabled the students and teachers to benefit from this initially intimidating machine, the researchers quickly learned the importance of developing Spanish-language software. In view of the lack of tools for teaching basic-level Spanish and mathematics in rural areas, Mr Rojas developed a series of teaching materials in Spanish as part of his research.

An educator by training, he worked closely with a computer programmer to write about 10 programs in the form of games or guessing games that enable students to master basic learning concepts. Some of these games provide children with means for improving their mathematical or reading skills. One program, for example, challenges children with a series of simple additions, subtractions, divisions, and multiplications. If the user makes three errors, the computer wins. The level of difficulty can be set from the start.

Similarly, another game provides a short text to be read by the child. The computer then asks a series of questions to evaluate the level of understanding. The program makes suggestions to identify synonyms and encourages the user to make associations of words.

All the programs were created both to assist teachers in achieving curriculum goals and to encourage individualized instruction for students — instruction that gives recognition for their efforts and rewards them for their achievements.

Teachers can, in practice, modify at will the exercises they give their students, increase or decrease the level of difficulty to take their strengths and weaknesses into account, and even incorporate subjects from their social and cultural environment. "The best thing is that, by developing programs for teaching the rudiments of Spanish, teachers

have the opportunity to bring in a wide range of other academic subjects such as history, geography and science, as language is the primary means of conveying this knowledge," says Mr Rojas.

Results to date are more than encouraging. Students at the 10 rural schools in Nemocón who took part in the pilot project show stronger interest in school, remain there longer, and generally get higher grades. Furthermore, they display greater confidence in their learning ability, largely because they can learn at their own rate, because the activities are more like a game than a classroom exercise.

"We observed quite an amusing side-effect: the students went home and talked about computers and the fun they were having with them and sparked their parents' curiosity to such an extent that some parents came to class to see their children operating these mysterious machines," explains Mr Rojas. "And, rather than regarding their children as slow learners who were not doing well at school, the parents took pride in their offspring and are now seeing them in a different light."

The Ministry of Education was greatly encouraged by the success of the Instituto SER pilot project and has extended it to about 40 schools in Bogotá. The teaching materials developed by Mr Rojas' team are now available for any computers using the DOS operating system, as well as for Atari computers, and can be used in any school system where Spanish is the language of instruction.

Marthe Lemery in Ottawa



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EXPORT INDUSTRIES TRICKLE DOWN IN TUNISIA



Shoe production falls into the textile category, which accounts for nearly 80% of the export-only enterprises that thrive in a near tax-free environment in Tunisia.

Tunisia, more than any other country of North Africa, has had a policy of openness to Western business and ideas since its independence. In the era of Habib Bourguiba, the longtime leader who was toppled in a coup in 1987, that meant going so far as to unveil a woman on television — a direct affront to traditional Islam.

Mr Bourguiba also initiated a policy, which has been carried through with vigour by his successor, of offering attractive conditions for foreign enterprises wishing to come and do business in Tunisia. Industries are encouraged even if all of the goods they produce and the profits they generate are destined for abroad.

Hundreds of companies, many of them in the booming clothing industry, took up Tunisia's offer, making the smallest country of the Arab Maghreb one of the region's most productive manufacturing centres. Although a few of these companies are branches of huge multinationals, most are smaller European firms.

Until recently, the government's policy of attracting export industries had been based on the assumption that it made sense to give benefits to foreign companies to encourage export production, rather than spending money on developing domestic industries in Tunisia. This assumption remained unquestioned.

It was left to researchers at the Tunis-based Agence de Promotion de l'Industrie (API), to carry out an IDRC-funded study to prove scientifically what could only be assumed before. With technical assistance from the economics department at the University of Sherbrooke in Canada, API conducted a survey of Tunisia's export industry sector and subjected their findings to rigorous analysis.

"We wanted to do a cost-benefit analysis of the implications of this policy for Tunisia," said Mr Moncef Abid, director of promotion at API and one of the project leaders. "Is it in the interest of Tunisia to further encourage these industries? How much will it cost Tunisia? How much will the country benefit? These were all questions we wanted to address," Mr Abid said.

As early as 1972, Tunisia had passed laws creating a favourable environment for foreign investment, offering tax advantages to industries that were mainly export oriented. The attraction, then as now, was to get foreign industries to invest in Tunisia and set up industries that would use Tunisian raw materials, and employ Tunisians even if the products were not for the Tunisian market.

In 1985 and 1987, further decrees were passed giving even greater advantages to such industries, exempting them from taxes on purchases of equipment, raw materials, and on their profits.

Only in 1976 was the first attempt made to study the benefits of such an investment policy. That limited study found that there was a gain in foreign currency because of the presence of export industries. Another study in 1982 aimed to find out what the nature of employment and wages were in export industries. This study concluded that women were being treated equally by export industry employers.

But it was the API study that tackled the overall question of whether targeting export industries was the best strategy for Tunisia. The answer was yes.

"The advantages which export-only enterprises offer are greater than the costs for Tunisia," Mr Abid said. "When there is foreign investment in the country it creates employment, and this is a benefit for Tunisia. Instead of having these workers go abroad to work, or emigrate, they can work here."

With an unemployment rate of 16%, or as high as 25% when the level of underemployment is factored in, Tunisia is heavily dependent on the export industries. Mr Abid said the study showed that some 20% of the new jobs created annually in the manufacturing sector are accounted for by export-only industries.

The API study was aimed at the 550 foreign-owned or controlled export-only industries operating in the country. Including such operations owned by Tunisians, there were 1,103 export-only enterprises in 1991, up considerably from 300 in 1982. Of the 550 foreign firms, most were French controlled, followed by German, Belgian, Italian, and American interests.

The study also showed that 80% of export-only industries were involved in the clothing or garment industry, which includes shoemaking.

The latter stage of the API study included detailed surveys done between 1986 and 1987. API officials travelled to Sherbrooke to carry out econometric analysis with their Canadian partners. Dr Peter Hanel, head of the Canadian site of the project, came to Tunisia to help with the preparation of the questionnaire and to provide technical assistance in the analysis of the findings.

"It's a shared project with their agreement," Mr Abid said. "The Canadians helped mainly in analysing cost-benefits."

It's an exchange: we have experience, the university has experience. We shared our experiences to put this study on its feet."

API was pleased to find that company heads seemed very satisfied with the quality of Tunisian labour, its stability, and productivity. "Globally speaking, it's a favourable tendency — a good indicator for our economy," Mr Abid said.

The study looked at the export industry contribution to foreign currency reserves and the various companies' use of Tunisian energy, water, and transport. Other factors such as salaries paid to workers, consumption by expatriate workers and its contribution to the Tunisian economy, and sales by export-only industries were also analyzed.

Mr Abid said that the export-only sector had created some 70,000 jobs. "Our interests are still satisfied, even if companies repatriate their profits," he concluded. "Jobs, the distribution of salaries and income, consumption by foreigners in the local market, all this is part of a total balance sheet — one favourable to continuing the policy of giving advantages to export-only industries."

The study emphasized the advantages of export-only industries, but a rather different event underlined the importance of foreign investment to the Tunisian economy. Before the Gulf War, Tunisia was attracting high levels of foreign investment, mainly from Western countries. But when the conflict between Iraq and the Allied countries heated up, a sharp drop in economic growth occurred. Foreign investment in Tunisia, a mostly Arab country, all but dried up. Economic growth for 1991, previously pegged at 4.5%, is now forecast to be zero.

API is a Tunisian public body created by the government in 1972 to promote development in the industrial sector. It falls under the authority of Tunisia's Ministry of Industry and Commerce.

API will use the results of the research to streamline and elaborate on the government's policy of giving priority to export-only industries.

Allan Thompson in Tunisia.



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BOLIVIAN STATE MINES: END OF AN ERA?



Bolivian miners struggle to make ends meet and worry about the future of the state mining corporation, COMIBOL.

Bolivia and mining — the two have been synonymous since the Inca empire. Deep inside every mine stands an effigy of the "tio," (literally, uncle), the guardian of the underworld who miners believe protects them from danger in exchange for daily offerings. But the Tio was unable to protect Bolivian miners from the collapse in international tin prices in 1985.

The tin crash had catastrophic results. Mines were closed, leaving 23,000 of the 30,000 miners in state-run mines jobless, increasing unemployment and hunger in South America's poorest country. "I'm really not sure from one day to the next if I'm going to be able to put food on the table for my five children," says Ana de Patino, whose husband worked for 35 years in Colquiri mine. "We never thought this could happen — that the mines would shut down and we would be left high and dry."

The state mining corporation, COMIBOL, was created after the 1952 Revolution that nationalized mines belonging to the so-called tin barons. The enterprise, which controlled 70% of Bolivia's mining until 1985, faced severe difficulties from the start. The mineral content of tin reserves had been dropping since the 1920s and the mines had been undercapitalized for years.

COMIBOL's bureaucracy grew quickly, with the ratio of underground to surface workers shifting from over 70:30 in 1952 to 35:65 by the 1960s. Little was invested in exploration and, since 1952, not one new mine had been opened. These policies meant that, by 1985, COMIBOL's accumulated losses reached US\$300 million in a country that contains some of the continent's richest mineral deposits. Tin, however, is still Bolivia's precarious lifeline, constituting the country's most important source of foreign revenue.

In response to this profound crisis a group of researchers founded the Centre for Mining Studies and Development (CEMYD) in 1986. With support from IDRC, they undertook the first comprehensive study of COMIBOL ever conducted. "Previous studies of COMIBOL had all been partial, oriented to solving immediate problems," explains Rolando Jordan, the mining economist who organized the multidisciplinary study.

With the approval of the Mining Ministry, the Centre undertook the challenge of analyzing COMIBOL from technical, economic, administrative, and social angles. The result was a study published in 1990 that offered a concrete plan to salvage COMIBOL, backed by a case study of the Colquiri mine.

CEMYD argues that despite moves toward privatization, state mining still has an important place in the country's future. "A well-run state mining company can provide far more benefits to the country as a whole than could ever be negotiated with private companies," insists CEMYD's acting director, engineer Juan Carlos de la Fuente. "COMIBOL can still play a vital role in Bolivian development."

The study, however, argued that the state mining company must change its structure — or disappear. In the early 1950s, there was much pressure on COMIBOL to cater to government needs for jobs (many for party members) and to divert funds to other sectors of the largely state-run economy.

The study pointed out the flaws in this approach. "COMIBOL responded to government demands rather than to any form of economic rationale," explains Mr Jordan. It also provided key social services, such as health and education, in the mining centres.

CEMYD contends that COMIBOL's fundamental logic must now be oriented toward market factors rather than these past objectives. Such a shift confronts considerable obstacles — obstacles familiar to many countries trying to reorganize their economic structures. Those in the COMIBOL bureaucracy have opposed any efforts that could erode their power. "Many of the top executives in COMIBOL and some members of the new government that took over in 1989 tended to see the CEMYD study as a personal attack which could end up costing them their jobs," says Juan Carlos de la Fuente.

As successive governments have failed to provide basic services to much of the population, the miner's union, the FSTMB, has strongly resisted any moves to diminish COMIBOL's role. "We have struggled for years to maintain basic services in the mines," says FSTMB secretary-general Edgar Ramirez. "If COMIBOL doesn't provide them, who will?"

As an alternative strategy, CEMYD proposed converting COMIBOL into a holding company that would not operate mines directly as it does now. "Our idea was to break the old patterns of state management and develop a real administrative capacity," says Mr Jordan.

CEMYD has also urged that committees be set up in each mining centre to determine the extent and potential of deposits and then seek out leading international companies to enter into joint ventures. The study advocated reducing decades of conflict between miners and operators, arguing that economically viable operations will increase benefits to the miners and their families.

Perhaps the most important aspect of the CEMYD study was its long term perspective, which contrasted with the emergency and short-term measures that have traditionally characterized state mining policies. "Unless this approach is taken," maintains Mr Jordan, "we will be unable to confront the underlying structural problems of the state mining sector."

In mid-1990, the government adopted a strategy that, in outward appearances at least, followed some recommendations of the study. Up to 30% of the staff of the central office of COMIBOL were to be dismissed, as well as 75% of staff in its five subsidiaries. As CEMYD proposed, COMIBOL was converted into a holding company and began an aggressive campaign of attracting private capital, both foreign and national, for joint ventures.

Central to the new plans was the passage of an updated mining code, which had been languishing in the Bolivian Congress for 3 years, leading many companies to look elsewhere for investment. The international MINTEC mining group, which 18 months ago was negotiating US\$250 million of foreign investments, has seen investors pull out because of the repeated delays, reducing the amount to US\$50 million.

The new mining code provides very attractive terms for private investors and, for the first time, permits access to rich deposits located close to Bolivia's borders. It facilitates the acquisition of concessions and places no restrictions on the repatriation of capital. The Mining Minister, Walter Soriano, has enthusiastically predicted US\$300 million in new investments during 1991, compared to only US\$25 million last year. According to more cautious estimates by industry observers, US\$40 million will be attracted over the next 5 years. By the end of the initial joint venture bidding in May of this year, 13 companies, most of them foreign, had submitted proposals.

The FSTMB miners union and mining cooperatives have criticized the code as a handover of the country's natural resources. "We believe that minerals belong to Bolivia, and the wealth they produce should benefit the country, not private companies," says Edgar Ramirez. "We fear that if COMIBOL is closed, we will have fewer services and have to live under worse conditions." The union has already managed to stall the operation of one foreign mining company but, according to CEMYD, it lacks a viable plan to address the structural problems in COMIBOL.

Mr Jordan says the problem is not so much one of state versus private mining as it is the need for the Bolivian government and COMIBOL to negotiate the right kinds of deals. "We have developed very little capacity to negotiate," he says. "The government has a tendency to accept whatever is offered in an indiscriminate attempt to attract



The miners' union, FSTMB, has strongly resisted any moves to diminish the role of the state mining corporation.

capital, without imposing conditions. So the companies interested are those that seek to maximize short-term earnings, exploiting the richest deposits without necessarily being leaders in the technology related to that particular mineral."

Despite the fact that several of CEMYD's proposals have been adopted, the Centre perceives a lack of coherence in the government plans that, it believes, will lead to continued failure. There are some important steps that need to be taken, Mr Jordan insists. "We have tremendous competitive advantage, even if Bolivia is landlocked and our infrastructure is poor," he says. "COMIBOL still controls the richest deposits in the country. The enterprise should adopt a strategy of seeking out the world's leaders in a particular mining field, and develop skill in negotiating contracts which could benefit the country. What we would like to see is the application of our proposal as a pilot project in one mine. Then we could really test its viability."

What will be the future impact of CEMYD's study? "We take the long-term view, just as we do for COMIBOL," says Mr Jordan with a wry smile. "We believe that all the current policies will lead to a dead end, and that they are merely serving to prolong the agony of COMIBOL's bureaucracy, without solving its problems. As this process continues its downward spiral, our proposal will gain a greater audience and acceptance."

Linda Farthing in Bolivia.



The miners' union fears that they will have fewer services and live under even worse conditions than they do now if the industry is privatized.



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THAILAND'S TUKTUK

Dodging the touting tuktuk — the Thai jitney — is an occupational hazard on the streets of Hatyai in southern Thailand. These small, four-wheel passenger carriers ply their shared taxi service throughout the city in the absence of any competition from public buses or taxis. The tuktuks are numerous and aggressive, contributing to the frenzy of streetlife in the downtown core, while often neglecting outlying areas of the city where fewer passengers are found.

In 1988, the IDRC funded a project led by Dr Pichai Taneerananon, a Thai civil engineer from Prince of Songkhla University, Hatyai, to study public travel patterns and tuktuk operations and to recommend to authorities ways of improving the city's transport system.

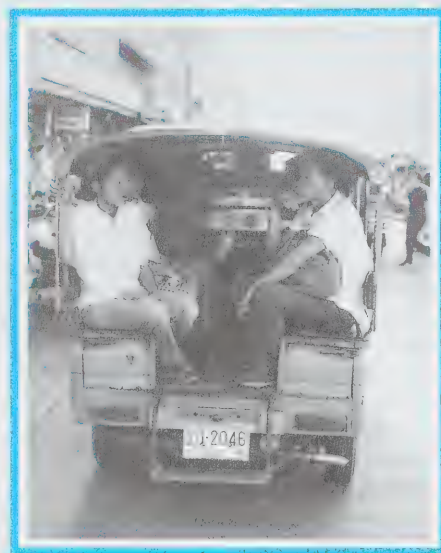
The tuktuk is similar in operation to other urban transit vehicles, such as the jeepney in the Philippines and the trotro in Ghana, which offer shared taxi service in the developing world. The tuktuk's only rivals for intracity transport are the samlor (a pedal trishaw) and, in increasing numbers, the motorbike.

Typically, a shared taxi ride by tuktuk within the downtown core costs as little as 4 bahts (US\$0.20). Although it is incumbent upon the tuktuk to deliver its passengers to their destination, it is up to the driver to determine the order of drop-off.

Most tuktuks only operate a shared taxi service within the city and are called urban tuktuks. Some also operate a fixed-route, bus-like service between the city and four nearby locations; they are known as queue tuktuks, because they queue in various regular stops throughout the city until their passenger load is secured.

All tuktuks, both urban and queue, are members of three cooperatives and one company. Not all drivers, however, are members; only those who own their vehicles are required by law to join. The cooperatives wield a measure of political influence, and no change in the operating patterns of the tuktuks can be introduced without their consent — and full support.

At the time Dr Pichai's study was undertaken, the number of tuktuks operating in the city of Hatyai — the major commercial and transportation centre in southern Thailand with a population of around 133,000 — was found to be 2,494; 19 tuktuks per 1,000. A household survey showed that 60% of the respondents use the tuktuks. The majority are employees



Because there are too many of them, most tuktuks are empty 40% of the time.

of private companies and shops, with students, traders, and housewives ranking next. Many travel between certain areas of the city on a regular basis.

Interviews with drivers revealed that on average a driver drives 12 hours a day, every day. A driver clocks some 186 kilometres and earns about 382 bahts (US\$15). More than 100 bahts (US\$4) goes toward the rent of their vehicle.

The study's analysis of the time urban tuktuks actually carry passengers confirmed the overabundance of the vehicles in urban traffic; the tuktuks are empty 40% of the time and when carrying passengers, the average number is between one and two. Even at rush hour, the streets are rife with empty tuktuks looking for business; touting, cutting across traffic, and double-parking. Evidently, if the streets of Hatyai are to be freed of some of the noise, congestion, and pollution that plague them, the number of tuktuks must be controlled. Because reduction of the total number of tuktuk drivers is out of the question (how else can these drivers earn their living?), the study looked to limit any increases. Dr Pichai's study, which was the focus of discussions in 1988 between provincial and municipal authorities and representatives from the cooperatives, strongly emphasized the need for controls. According to an interview this spring with Mr Khun Manit Suksomboon, the Land Transport Provincial Chief, overall, the number of tuktuks in Hatyai in 1991 is the same as it was in 1988.

The study further recommended that drivers be encouraged to take a day off a week. If organized properly, Dr Pichai argued, the drivers would earn more during the hours they actually worked so that over a period of, say, a month, their income would remain the same. Of course, as with all the study's recommendations, any change in the drivers' work patterns must come about voluntarily. "Some drivers said it would be difficult to do," wrote Dr Pichai in the study report, "since most drivers have regular customers such as school students and market traders." To date, the voluntary day-off scheme has not been adopted by the cooperatives.

One recommendation of the Hatyai study, widely recognized from the start as having the potential to transform the chaotic nature of tuktuk traffic, suggested a number of fixed-routes at low, fixed rates within the city in the fashion of regular bus runs. Such a move would reduce the traffic hazards



Some tuktuks operate on a fixed-route service because they "queue" at regular stops until the passenger load is secured.

created by unregulated competition while serving people living in less populated areas of the municipality where urban tuktuks often refuse to go at normal rates.

During the period immediately following the study, several efforts to establish fixed-routes on a trial basis were made. These foundered. Excessive caution on the part of government authorities, suspicion between the cooperatives, and apprehension expressed by the drivers themselves, all played a role in hampering the progress of the trials. "This is quite understandable," reported Dr Pichai at the time. "The whole thing is a voluntary attempt to improve the existing system and, therefore, it is about change. Making change is a slow process; it calls for trust, cooperation and patience."

The objections made by the tuktuk drivers to the institution of fixed-routes were clearly based on fears of how these routes might jeopardize their earning power. Short-term loss overshadowed the recognized potential of long-term gain and without the emergence of a strong leadership from within their ranks, no trial could attract a sufficient following. In 1988, "the cooperatives were fighting about who should operate which routes," says Dr Pichai. "As a result, no one was operating any fixed-routes."

The mistrust between the cooperatives has apparently receded in current times. In its place thrives a spirit of collaboration. The two largest cooperatives, representing 70% of Hatyai's tuktuk drivers, have plans to establish a fixed-route on a 6-month trial basis — plans that appear to have an excellent chance of success, says Dr Pichai.

The cooperative leaders, anticipating that the trial tuktuks will operate at a loss for the first 3 months, have decided to use eight of their own vehicles in the trial. In this way they will demonstrate to their members, their confidence in the long-term benefits of such fixed-routes.

The tuktuks will make regular stops in front of the university, the hospital, and government buildings of Hatyai, although initially the drivers are prepared to be flexible until the route is well-known to the public. To increase public awareness, the cooperatives hope to get the municipal authorities to sponsor television advertisements informing the citizens of Hatyai of the inauguration of the new route.

"If the cooperatives do this well," says Dr Pichai, "they will have a reason to try other routes." Already the cooperatives have other routes in mind and talk about eventually using pickup vehicles that can carry 20–25 passengers along the fixed-routes.

What has changed in the intervening years is that the two largest cooperatives are now talking. "They realize that if they don't cooperate, it won't work," says Dr Pichai. "Now the two have joined hands to operate this route."

As a symbol of their willingness to work together, the cooperatives, one of which paints its tuktuks blue and the other red, have decided that the trial vehicles will be red and blue. "You see, they have good ideas," comments Dr Pichai. "But they need support, which it is the duty of the government to supply. When we did the report, we got them together to discuss these things and try to make things happen." And happen they did.

Elizabeth Lewis in Thailand.



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POISON INFORMATION NETWORK

The country of Sri Lanka is increasingly concerned with a health problem that, next to heart disease, is the foremost leading cause of death in hospitals: poisoning.

"There have been alarming increases in poisoning cases in Sri Lanka over the last decade," says Professor Ravindra Fernando, head of the country's National Poisons Information Centre (NPIC), "19,597 such cases were admitted to state hospitals in 1979, and by 1988, this figure had risen to 32,848. There are now over 2,000 deaths per year."

It is estimated that another 1,500–2,000 people — mainly in the rural areas — die before admission to hospitals, raising this figure to around 4,000 deaths annually.

Pesticides are the predominant cause, accounting for nearly two-thirds of all poisoning cases. A 1982 survey by the World Health Organization (WHO) revealed for the first time the magnitude of the problem posed by pesticides in a developing country. Health workers and researchers attribute this trend to an ever-increasing use of pesticides in agriculture, leading to greater unrestricted availability.

The majority of poisoning cases, about 75%, are through the deliberate ingestion of pesticides in suicide cases. Occupational and accidental poisonings account for the rest.

Pesticides kill several Sri Lankans every day — most of them under 40 years of age. In addition, an average of two people die daily from snake-bites. Plant poisons and medicinal, industrial, and household chemicals are also a factor in the number of poisonings. Some severe poisoning cases die before they are able to reach a hospital. Preventable deaths occur even among those who are admitted, mainly because doctors and paramedics are unable to identify poisons and the specific symptoms of poisoning. Occasionally, doctors fail to give the right treatment.

It is, however, unrealistic to expect clinicians to remember the constituents, toxic effects, and symptoms of, and appropriate treatment for, several hundred pesticides, drugs, and other chemicals. This situation warranted a central institution that would act as an information bank storing all this information.

The National Poisons Information Centre was set up by the Government of Sri Lanka for this purpose: to provide quick and reliable information to clinicians on identifying and treating poisoning cases 24 hours a day, throughout the year.

The first of its kind in South Asia, the Centre is strategically based at the 2,000-bed General Hospital in the capital, Colombo. The groundwork for the Centre started in 1986 at the Colombo University's Medical Faculty. The facility was established at the Hospital in 1988 under a 3-year IDRC grant, which is now complete.

Here, three information scientists, aided by several doctors, work around the clock responding to inquiries coming from all parts of the country. The telephone is the main medium — 86% of inquiries in 1990 were made over the phone. Written requests and visitors are also accommodated.

The Centre stores information using several thousand "Poison Index Sheets" on various poisons. These are arranged in alphabetical order with easy cross reference. This retrieval system will be greatly improved with the Centre's new computers.

When a call comes through, the scientist on duty takes note of all pertinent and available information about the case: the victim's age and sex, symptoms, poison involved (if known), and any treatment already given. Then, the relevant Information Sheet is quickly retrieved and pertinent sections are read over the phone.

If additional medical advice is needed, the Centre's head, or the doctor on duty, speaks directly to the caller. Every effort is made to follow up each case after a few days to record

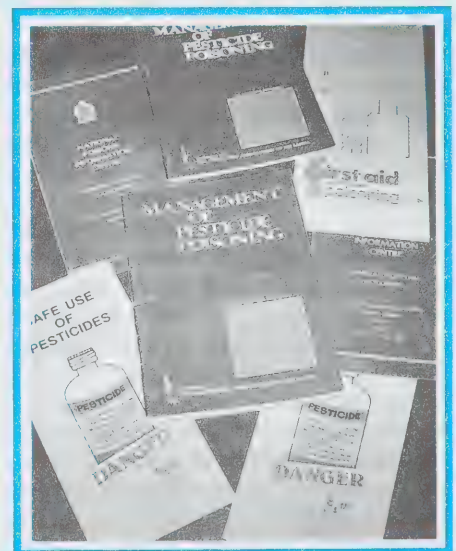
the final outcome in detail. "This is difficult and, on some occasions, impossible due to the poor telecommunication facilities," says Professor Fernando.

The privacy of individuals is protected in all poisoning cases: hospital records or follow-up reports do not bear patient's names.

In 1990, the NPIC received 469 inquiries, of which 127 (about 27%) involved pesticide poisonings. This was followed by 97 involving industrial chemicals (21%) and 75 on drugs and therapeutic agents (16%). There were only 12 cases of snake-bites, for which both traditional and Western treatment are more readily available.

Since it started, the Centre has responded to more than 1,000 inquiries. "Every year we have had more inquiries than the previous year," says Professor Fernando. "Doubtless many lives have been saved because of this facility."

In addition to information and advice, the NPIC also provides essential antidotes to hospitals and general practitioners. More and more doctors are now aware of the Centre's work and are increasingly seeking information assistance, according to Professor Fernando.



NPIC also produces numerous publications that add to its role as a poison information bank.

NPIC has responded to more than 1,000 inquiries about poisons since its opening



The retrieval of valuable "poison index sheets" will be greatly improved with the NPIC's new computers.

The Centre is also gaining national and international recognition. For instance, it has been identified for the use of a computerized data package through a project jointly sponsored by IDRC and WHO's International Programme on Chemical Safety (IPCS) — under this activity several monographs on poisoning agents have been completed.

In 1990, the NPIC also became a full member of the World Federation of Associations of Clinical Toxicology and Poison Centres, which is affiliated with WHO.

On the research front, NPIC is completing several epidemiological studies and results are now being assessed. A manual on diagnosis and treatment of acute poisoning designed for use by doctors will be published in late 1991.

Another Centre initiative includes exposing final year medical students to the operations, management, and services of the Centre. This is expected to maximize use of the facility in the future.

Despite these advances, some practical difficulties remain. The system is vulnerable to occasional breakdowns in telephone lines as it relies on this medium to communicate information. More staff and analytical testing facilities are also needed. The Centre is currently seeking funding to set up its own analytical laboratory.

Once fully operational, the NPIC is expected to reduce the increasing trends in morbidity and mortality from poisoning in Sri Lanka.

Given the country's predominantly agriculturally based economy, which requires the use of agrochemicals such as pesticides, and its numerous public health problems, such as malaria, restricting pesticide and drug use is easier said than done, argues Professor Fernando. The control of malaria and other vector-borne diseases will continue to rely on various insecticides and pesticides, he says. The alternative is to live safely with the hazardous chemicals.

The Poisons Information Centre is working toward this goal through initiatives such as public lectures and the distribution of posters and leaflets and sustained media coverage. The Centre's staff have been active in enhancing public education and awareness on poisoning and its prevention. Their conviction is a familiar one — prevention is better than a cure.

Nalaka Gunawardene in Sri Lanka.



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PAULOWNIA'S PERSISTENT ADVOCATE

The story of world-renowned Chinese forestry researcher Professor Zhu Zhao-hua is rich with the irony of the often-muddled relationship between politics and development. Prof. Zhu is one of the pioneering forces behind the modern use of the fast-growing paulownia tree in China. But his road to success — as that of many researchers in developing countries — was often marked with obstacles.

Prof. Zhu first became interested in paulownia in 1972 when he was asked to collect seeds of two paulownia species, *Paulownia elongata* and *P. glabrata*, for Argentine researchers. "I knew very little about paulownia then," Prof. Zhu says. "I began to ask experts about the two species but nobody could tell me about them or where they grew." After finding descriptions of the two species in an old journal, he rushed to the Shandong and Anhui provinces of China where large tracts of the paulownia were grown. Although he admired the long cultivation history of the tree in these regions, he discovered backward cultivation methods and a confusing classification system for the various species of paulownia.

Upon completing this initial research, Prof. Zhu realized the importance of the tree for the Chinese people. "Fast growth is a basic characteristic that makes paulownia the first choice in people's fight against natural disasters," he says. While investigating paulownia species, he noticed that farmers planted paulownia to compensate for failed crops stricken by storms or water logging. On vast plains in east and north China, myriad shelter systems of paulownia trees protect crops from sand storms and moisten soil, ensuring good harvests from one of the country's breadbaskets.

"Paulownia is a treasure-house for farmers," Prof. Zhu says. It provides faster economic returns than any other tree variety. After 3 or 4 years, paulownia wood can be used. Light and strong, it is a good material for making furniture, toys, plywood, musical instruments, and for packaging. Its flowers produce honey and medicinal materials and its leaves are more nutritious than alfalfa when fed to livestock.

Besides, Prof. Zhu notes, paulownia is compatible with various plants such as wheat, cotton, maize, bamboo, tea, and apple trees.

"I decided quickly after my initial research that I wanted to do more work in this area," he recalls with confidence. "Since then, paulownia has taken all my energy."

Much of this energy was used to overcome unexpected hurdles. For instance, when Prof. Zhu returned to Beijing after his visits to the provinces, he excitedly suggested launching a research project on paulownia. "This was my first opportunity to work on a really meaningful project since I graduated from Lanzou University in 1962," he says.

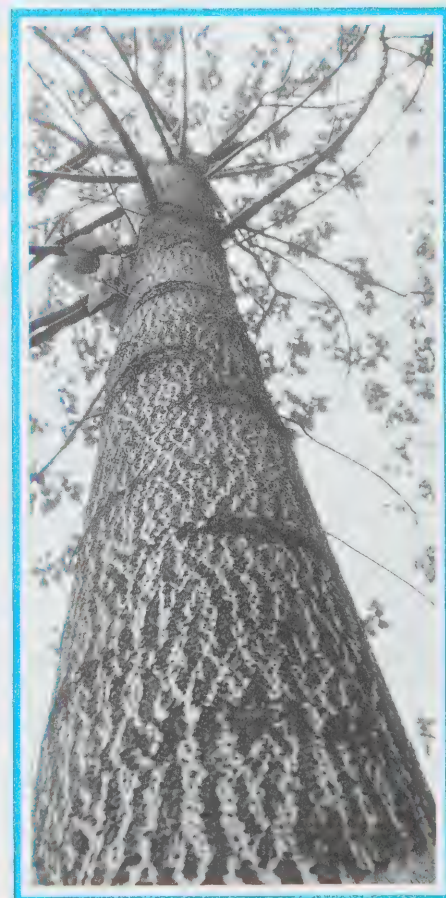
Prof. Zhu's idea was accepted by the then Minister of Forestry, Linag Changwu, but officials of the Chinese Academy of Forestry (CAF) inexplicably turned him down.

China at this time was in an intense internal struggle, known as the Cultural Revolution (1966–1976). The political power plays between Chairman Mao and various anti-Mao factions resonated throughout Chinese society, creating disorder and turbulence at almost every level.

The Chinese Academy of Forestry was no exception. The Academy disbanded several of the institutes it supervised. Prof. Zhu, who worked for an institute under the Academy, was assigned to a rather different job. He, like many other talented researchers around him, was sent to feed pigs in the rural areas of China! His research skills were to be wasted.

Fortunately, he did not give up but decided to do "underground" research. He looked for historical references to paulownia, and was fortunate enough to locate a number of old manuscripts

"Paulownia is a
treasure-house
for farmers"





Prof. Zhu (second from right) shows a group of visitors around an experimental plot of paulownia-tea intercropping.

on the subject, some dating back 2000 years. He even found a monograph on paulownia published in 1049. "It is very scientific and useful," Prof. Zhu says.

Carrying a 15-kg sampling box, he trekked through 19 provinces, talking to farmers and gathering information on the geographical distribution of paulownia, climatic and soil conditions suitable for its growth, and how it was interplanted with crops.

He left home in spring and returned in winter, spending at least 7 months a year in forests, leaving his wife Tong Qingjuan, a researcher at the Chinese Academy of Agriculture, looking after their two sons. "I was afraid to meet her complaining eyes when I came home after a long stay in the provinces," he says.

In 1979, Prof. Zhu's persistence finally paid off and he and his fellow researchers got financial support from the Chinese government. In the ensuing years, their research came out into the open and expanded. They established six experimental stations — one for each of China's major climatic zones. Each of the bases has a paulownia gene pool.

They collected different species from all parts of China, grew them as seedlings, clones, and root cuttings.

About 850 super trees were selected, grown, and tested for desirable characteristics such as exceptional height and diameter. Four, high-quality clones have been bred and made available for use by Chinese farmers.

Another team under Prof. Zhu's leadership is currently dedicated to improving the cultivation technology for paulownia. Today, a 15-centimetre long root cutting planted in the spring can reach 6 metres in 3 years, twice as fast as previous species. It is not unusual for a 5-year old tree to reach 17 metres in height and 30 centimetres in diameter, he says.

As for intercropping, Prof. Zhu and his colleagues experimented in growing tea, apple, pear, and other crops with paulownia trees. They have found that the spacing of paulownia trees in this intercropping system is a major determinant of crop yields. Sometimes, crop yields will be the same as for openfield cultivation. When distances between trees and rows are enlarged, however, crop yields frequently go up.

Prof. Zhu and his colleagues also write extensively. They have published 16 treatises in Chinese, summer journals, and a comprehensive book on agroforestry systems in China, published recently. To raise awareness about paulownia, they have made four TV documentaries and a magazine on paulownia.

In 1983, Prof. Zhu's research team received financial support from IDRC to help in the successful execution of their program. "IDRC's financial aid enabled our research to enter a new phase," he says. "With the money, we bought new equipment, started paulownia-related training and were able to continue our research in a more scientific way."

As a result of his excellent research record, Prof. Zhu was appointed as executive director of an IDRC farm-forestry project — an important, multimillion dollar project involving many areas of expertise at IDRC's regional office in Singapore. In the new program, he has been promoted to take charge of all 17 subprojects including one on paulownia.

Despite having to participate in more international activities now, he continues to devote much attention to paulownia research. "Next step, we will measure changes in nutritious elements in crops before and after they are intercropped with paulownia. New findings will help us understand how paulownia influences nutrition for farm families," he says.

Partly because of his efforts, the cultivation of paulownia has become a growth industry in rural China, bringing wealth to farmers and helping boost farmland yield.

Today, an estimated 1.2 billion paulownia trees are grown across the country, providing farmers with fine lumber for house construction and furniture making.

In addition, the country has been exporting some 60,000 cubic metres of paulownia logs and planks to Japan annually, with an estimated value to the Chinese economy exceeding US\$30 million.

For his outstanding contributions to forest conservation and public education in forestry, Prof. Zhu received a "Man of the Trees" award from the Richard St Barbe Baker Foundation based in Saskatchewan, Canada.

The award is a fitting cap to an impressive career — a career marked with formidable tests to the persistence and research skills of Prof. Zhu Zhao-hua.

Zhou Peidi in China.



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A NEW TOOL FOR DEBT MANAGEMENT

The debt crisis in its present proportions erupted in 1982 when Mexico, the world's largest Third World debtor, suspended its debt service payments. Reasons for the crisis can be traced back to the mid-1970s when a combination of macroeconomic shocks in the world economy, imprudent borrowing policies in the debtor countries, and imprudent lending by commercial banks, left many countries in the developing world unable to meet their loan obligations.

A resolution to the crisis was sought through a combination of policies, including debt forgiveness, debt reduction, debt rescheduling with varying degrees of concessionality, and structural adjustment programs negotiated with the World Bank and the International Monetary Fund (IMF). As part of this solution, developing countries were encouraged to improve their economic management capacity by establishing appropriate debt-management operations, as real interest rates rose, commodity prices fell and the world entered a recession.

The complexities of international debt management have plagued many Third World governments. Given the size and technical complexity of developing-country debt, the task of recording and organizing loans has proved beyond the capacity of many countries. This has led to massive confusion with respect to information and procedures regarding debt payment. One government, for example, incurred additional interest and penalty charges simply because the officer who was handling the payments was on leave and the instalment was late. Another government paid the same instalment twice. Yet another saved millions of dollars only after recognizing that a high-interest loan could be refinanced and replaced with one bearing a much

lower interest rate. These particular examples are neither isolated nor hypothetical; they are indications of the often chaotic state of debt management and data collection in developing countries. Indeed, these instances illustrate the importance of proper loan administration and well-informed debt management — factors now recognized as critical in dealing with the current debt crisis. Effective debt management is the first in a multitude of steps toward surmounting the debt crisis.

In 1983, the Technical Assistance Group (TAG) of the Commonwealth Fund for Technical Cooperation (CFTC), Commonwealth Secretariat (CS), established a program of advisory services in external debt management. The objective of the program was twofold: to address the "information crisis" resulting from countries' inability to cope with the volume of data on external debt, and to provide a low-cost, microcomputer-based, user friendly system for the accurate recording and quick recall of debt-related data. At this point, TAG/CFTC turned to IDRC for technical and financial support for the development of the specialized software required to run this system, which is now known as the Commonwealth Secretariat Debt Recording and Management System (CS-DRMS).

Apart from assisting in the development of CS-DRMS, IDRC has also been active in disseminating and enhancing use of the system. These activities include the installation of the system in Sri Lanka on a pilot-project basis; cofinancing, with CFTC, the development and testing of training materials to help prepare staff in the use of the software; and assisting the Eastern Caribbean Central Bank (ECCB) to make CS-DRMS available to its eight member States.

To date, the system has been installed in 26 Commonwealth countries. These countries now have an overall legal and institutional framework to enable them to monitor the contracting, spending and repayment of loans. They can practice both "passive debt management" (e.g.,

they now know when payments are due) and more active management (e.g., the development of an effective borrowing policy to, inter alia, keep debt service costs to the minimum).

The CS-DRMS system has two basic advantages. It enables governments to develop the ability to make a payment on time, and to view their "payment profile" (the "bunching" of due payments) to assess whether a loan could be refinanced and paid off with one bearing lower interest. In fact, one government saved close to US \$5 million in interest payments using this method on the basis of the data supplied by the system. Another government department recognized, after implementing the system, that it was owed money by other local bodies to which proceeds of a loan had been on-lent. CS-DRMS, therefore, notifies governments of who they owe money to, and who, in turn, owes them money.

It is important for Third World governments to consider such benefits in deciding to introduce a system like CS-DRMS. Clearly, there will be costs of time and money beyond those donated by IDRC, the CS, or any other donor. These costs, however, could be paid off by a single instance of interest savings or through an advantage gained in a loan negotiation.

Many of the benefits of CS-DRMS are as a result of the reports that it generates. The system generates nearly 100 different reports, which can be produced virtually at the push of a button. As well, an agency can produce its own original report(s). The system generates two very useful reports — one that states the payments due on a day-to-day basis over a 1-month period, and an "arrears report." Moreover, CS-DRMS produces reports specifically required by the World Bank and the IMF.

The fact that various international financial institutions require different reports has given many a developing-country official nightmares. Despite the difficulties involved in building and maintaining the data base, the potential benefits to be derived from the effective use of the system are tremendous.

The results of a recent survey indicate that governments have continued to use the system, at least to provide them with their reporting requirements, after it has been installed. However, its use in active debt management — to generate "what if" scenarios, for example — varies from case to case. Nevertheless, a number of governments have used the software for working out scenarios in preparation for Paris Club reschedulings. One of the limitations of the Commonwealth Secretariat's program, from a wider Third World perspective, is that the distribution and installation of the CS-DRMS software is confined to the 49-member Commonwealth, although it has been installed in Mozambique and Thailand through special arrangements.

Recently, this restriction was addressed in a joint project by IDRC and the Canadian International Development Agency (CIDA). This project aims to establish an in-house capability, in IDRC, to deliver a program of advisory services in debt management to non-Commonwealth countries, with a focus on the

countries of Francophone Sub-Saharan Africa. IDRC has already conducted an in-depth survey, in conjunction with the United Nations Institute for Training and Research (UNITAR) and the French Ministry of Cooperation and Development, to determine the state-of-the-art with respect to debt management and to assess the needs of specific countries in Francophone Sub-Saharan Africa. The IDRC/CIDA project will also look into the feasibility of developing a French-language version of the software.

This initiative is, in fact, the Canadian government's response to one of the recommendations contained in the House of Commons External Affairs Standing Committee's report on the debt crisis. The Committee recognized IDRC's contribution in the Commonwealth program, but pointed to the need for an expanded Canadian contribution in the field of debt management. The IDRC/CIDA program is modelled on that of the Commonwealth and uses the CS-DRMS software, which has been made available to IDRC under a

Distributor Agreement signed between IDRC and CFTC. The CS will, however, retain responsibility for not only maintenance but also for any enhancement in the software.

A basic tenet of IDRC is that research and related activities on developing-country issues should, where appropriate, be carried out in the South. In keeping with this philosophy, IDRC hopes that, perhaps during a second phase of the joint IDRC/CIDA project, up to three regional CS-DRMS resource centres could be eventually established to assume the task being executed by the in-house project.



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IMPLEMENTING A DEBT MANAGEMENT SYSTEM

Governments interested in implementing an effective debt-management system will likely need to keep the following steps in mind:

- A thorough **needs assessment study** should be carried out with regard to the country's internal capacity for external debt management.
- A **detailed plan for coordinated debt-information management** should be developed before the system is actually implemented. As well, problems of mandate, overlap, information flows, and data standards should also be resolved at this time.
- A **Debt Management Office (DMO)** should be established at an appropriate location to deal with the organizational arrangements for debt management. It is essential that the terms of reference of the DMO are drawn up and accepted by the government. These should be circulated within the administration and to all creditors. Staff with skills in loan operations and loan accounts, basic computer literacy, and knowledge and experience of loan instruments and capital markets should be recruited for the DMO if they are available in the country. It is also necessary to appoint a high-level Debt Policy Committee to provide guidance on borrowing and guarantee levels and the terms of such loans and establish ceilings for relevant debt indicators.
- **Training should be provided to the staff of the DMO in aspects of debt management** that are relevant to the needs of the country. The training will be staggered during project implementation and take place at different stages.
- A **well-defined legal and institutional framework** should be set up to monitor the contracting of loans, their utilization, and repayment. The framework will cover loans by the government, parastatals, and the private sector.
- Data requirements for a DRMS project should be set out and **administrative arrangements** made for their compilation. These will cover all aspects of loan operations including historical transactions for the period for which the government wishes to collect data. The information should cover the basic loan details and terms of repayment, which are available from loan agreements, and actual transactions covering loan disbursements and all debt-service payments. When a project is being implemented, an inventory of past loans should be built up and the data updated regularly.
- Once the data have been compiled, **facilities are necessary for their storage, retrieval, and analysis.** Projects may initially involve the establishment of a sound manual system with computerization introduced when this is fully operational. At this stage, appropriate microcomputers, the Xenix operating system that facilitates multiuser access, and the INFORMIX 4GL/SQL data base management system, need to be purchased for the installation of the CS-DRMS software.
- Once the system has been installed and the data have been compiled, planners can use the reports generated from the resulting data base on national external debt as a **decision-making support tool.**

Waterlines

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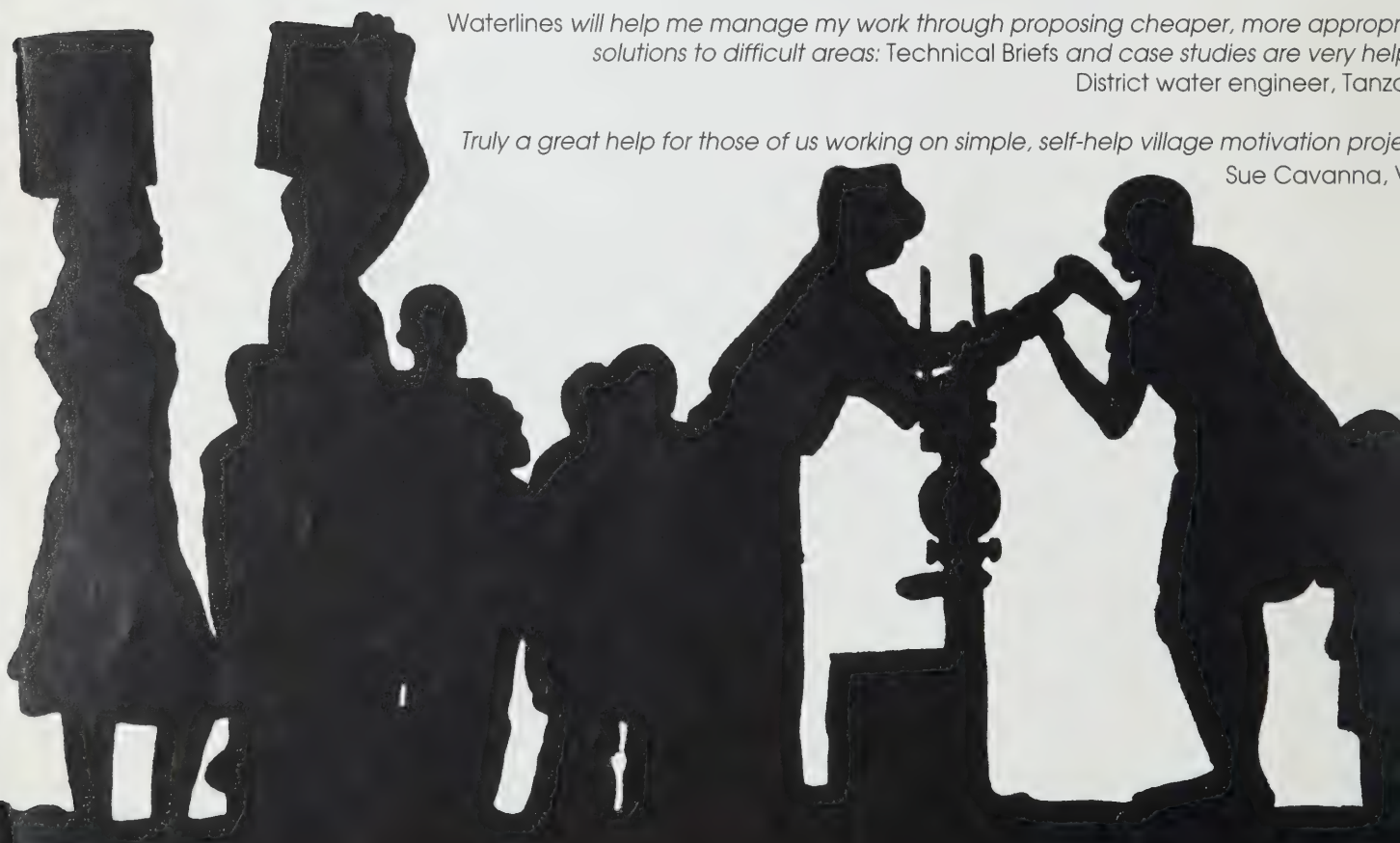
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CANADA

Perils in the Workplace

REPORTS

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FOCUS

For millions of workers in developing countries, staying healthy in the workplace — or just plain surviving — is a daily challenge. Whether self-employed in the informal sector, hired just for the day, or employees of large enterprises, these workers often run the risk of occupational accidents and disease.

Workers in the South lack relevant information on the materials they handle every day: some know the risks but are unable to protect themselves or change their working environment. In thousands of shops and factories, they have little protective equipment, like gloves and goggles, and work with obsolete and unsafe machinery.

Although governments of these countries have put forward legislation on occupational health issues (usually derived from industrialized countries), they frequently cannot enforce it in the absence of necessary financial, technical, and human resources. And most efforts to improve working conditions still focus on the formal sector, yet neglect to address the increasingly important economic activities of the informal sector.

Researchers, however, have remained committed to the goal of bringing health and safety issues in the workplace to the forefront of public knowledge. New approaches to occupational health seem to hold great promise: approaches such as participatory research and simple techniques like walk-through surveys of safety conditions in the workplace. In this issue, we explore IDRC projects that are using these techniques to raise the health standards for all workers — from those employed in the huge steel mill surrounded by shanty towns to the local villager toiling in the small cottage industry.

Editor-in-Chief

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Cover photo : Denis Marchand



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OCCUPATIONAL HEALTH AND DEVELOPMENT

Occupational health and medicine in the workplace have customarily been seen by researchers as the prerogatives of industrialized countries — a "luxury" for the rich.

Developing countries, however, are beginning to recognize that the health of workers is not just a luxury but a crucial part of total health care. The South is increasingly taking notice of occupational health issues and looking to make changes.

Numerous obstacles, however, are in the path of change. In developing countries, there are vast areas of the "underground" economy that operate without regulation of any kind. Women and children are involved in the production process in a large number of informal and even family enterprises. Few of them are protected by laws governing occupational health and working conditions.

The vast majority of agricultural workers are also unprotected. Despite the hazards of exposure to pesticides or agricultural machinery, they are almost always excluded from official compensation programs for workers injured or killed as a result of accidents on the job or work-related illnesses.¹ (See also *IDRC Reports*, July 1989.)

Workers who migrate to uninhabited country in search of natural resources expose themselves to hazardous vectors and parasites that can cause serious diseases, like leishmaniasis. Leishmaniasis, transmitted by a small, parasitic sandfly called *Phlebotomus*, causes not only disfiguring skin lesions, but also *kala azar*, a fatal intestinal disease. This insect lives in sandy soils and thrives on such human activities as mineral prospecting, petroleum exploration, road construction, and forestry. Once confined to agricultural areas, this debilitating disease is now within range of large segments of the population not previously at risk.²

It is also easy to overlook the fact that the South is not exclusively agricultural, much less homogeneous. While the country of Rwanda in East Africa has about 90% of its population working in agriculture, only 25% of Costa Ricans in Latin America are employed in this sector. Growing urbanization attracts the young in search of work and improved living conditions. The predominantly young, poorly educated labour force is frequently ill-adapted to skilled employment. Low levels of education make them particularly vulnerable to the risk of accidents and occupational diseases — characteristics of which they barely comprehend.

In some parts of the world, unskilled, cheap labour is particularly affected by the need to migrate. Trans-border migration between South Africa and neighbouring countries is a good example. In such cases, the temptation may be very strong for the host country not to bother with the occupational health problems of its itinerant workers, who do not have the benefits of citizenship. When these workers are sent back home, handicapped by a work-related accident or illness, their condition often exacerbates the low productivity of their home country because they become a burden on their family, their community, and their country's health care system.

Mechanisms that protect the health of workers in industrialized countries frequently seem inoperative or ineffective in developing countries. There are several reasons for this. First, even where regulations exist and where the health care system is capable of delivering professional services, it is apparent that control measures cover only a small fraction of the workforce.³ A recent Egyptian study, for example, indicated that 92% of businesses in Alexandria had less than 50 employees and that few of them were known to the government. The main problems identified in this study were exposure to dust, noise, and excessive heat.⁴

Another key reason is that very little research has been done to date on occupational health problems in the Third World. The shortage of trained professionals in this area and the frequently limited or nonexistent infrastructure for research are major problems. The will may be there but the resources are not. Funding, from either national or international sources, also commonly falls far short of what is required.

Research as a Tool

Certain initiatives, however, offer a glimmer of light at the end of the tunnel. One is the training and information program in occupational safety and medicine set up for African countries by the United Nations International Labour Office (ILO) with the support of the Finnish government (FINNIDA). This program, to be carried out over a 20-year period, will benefit from the support of the renowned Finnish Occupational Health Institute.

Some Third World countries are also starting to finance research into occupational health. This was reflected in a recent inventory of occupational and environmental health research, funded jointly by IDRC and the WHO.⁵ Among the study's findings was the fact that countries with rapidly growing economies such as Brazil, China, South Korea, India, and Thailand are the most active in this area. The study also established that 77% of the projects dealt with hazards related to chemical products and 26% with the physical dangers faced by workers. One encouraging figure was that about one-fifth of the projects dealt with agricultural hazards.

The same study also found that only 13% of the projects surveyed are financed by international donors. IDRC is one of the leaders, followed by the Swedish Agency for Research Cooperation with Developing Countries (SAREC) and several U.S. government agencies. The WHO and the Pan-American Health Organization (PAHO) also sponsor a number of worthwhile projects.



Barefoot workers with no protective goggles and an exposed driving belt — safety precautions are needed.



Agricultural activities, like pesticide spraying and even simple winnowing, also pose health risks.

IDRC's enviable contribution to the support of this research reflects the existence since 1981 of a specific program of aid to research in occupational and environmental health. To date, IDRC has devoted an average of just over half a million dollars annually to occupational health and safety research in the Third World.

What Type of Research?

The primary focus of recent research has been on selected mining or industrial activities, mainly because national governments are keen to exploit their natural resources. Parallel to this trend, research on job-site accidents and respiratory diseases caused by dust inhalation^a such as silicosis, anthracosis and byssinosis^b continues to attract the attention of numerous Third World researchers.

Although these issues are important, there is still little information available on toxic substances and on processes that are dangerous to workers' health. At the same time, researchers cannot hope to manage health and safety in the workplaces of developing

countries without first creating factual data bases (on the workforce, industry, accidents, chemical substances, and occupational diseases). The creation of effective information systems should be a priority for government authorities responsible for workers' welfare. Research will play an essential role, not only in contributing to knowledge but also in evaluating the systems and gauging their impact on workers' health.

In medium-sized and large businesses, researchers' efforts should concentrate on methods for evaluating safety in the workplace. Preference should be given to simple techniques for rapid inspection ("walk-through surveys"). Without requiring expensive procedures, they can yield essential information by providing summary descriptions of hazards and indicating the existence of serious risks to workers' health.

Once these problems have been identified, research can focus on evaluating the prevalence of occupational diseases. Without epidemiological data and the ability to demonstrate the harmful effects of occupational hazards, it is difficult to persuade authorities to improve working conditions. Frequently, as is well described in Dr Sekimpi's project in Uganda (see p.12), the greatest hazards are posed by aging, dilapidated machinery.

Sometimes, the risks that need to be considered and controlled are inherent in the job, as in the case of Dr Jiang Chao-Quiang's study of byssinosis prevalence in Shanghai's textile industry (see p.14).

Very often, the products being handled throughout the workday are highly toxic, such as pesticides. In this context, Dr Mohamed M. Amr has shown the extreme dangers faced by Egyptian workers (see p. 15). To reduce the threat to health, employers must educate their employees and provide adequate protective

equipment. From his findings, Dr Amr established an educational program for both workers and employers that has succeeded in awakening public and political opinion — the two key elements in the fight to reduce occupational hazards.

Worker Participation

One of the great advantages of the rapid inspection method mentioned in the foregoing is the possibility of leaving it in the hands of workers themselves. Participatory research techniques have resulted in innovations in a number of cases, as described in the two following articles. Participatory research allows workers to play an active role and identify the risks to which they are exposed on a daily basis. They can then decide how to force the necessary corrective action. Clearly, the existence of organized groups (unions or workers' associations) facilitates the establishment of participatory research projects. This is an avenue worth exploring much more seriously than has been done to date.

The IDRC-funded project of Professor Laurell in Mexico clearly shows the ability of workers to identify the real occupational problems they face. The same project also showed the extent to which the social and political context can influence the results of this type of study.

Surviving "Underground"

How can this intervention work in the informal sector? Two main points should first be clarified. One, the problem is linked to the exploitation of the most vulnerable individuals, often women and children. Legislation to prevent child labour, although it often exists, is rarely applied due to the lack of human resources.

Second, the vast majority of informal businesses are unknown to the government and, therefore, are extremely difficult to regulate. In such a situation, the best solution seems to lie in raising community awareness of the serious dangers that many current practices in the informal sector pose for women of reproductive age and growing children. Researchers who deal with this problem need to develop a more accurate picture of

working conditions in this sector to identify the hazards and their health-related consequences. They also need to propose and evaluate feasible alternative solutions to current work practices and determine the best means of sensitizing the community who, in the final analysis, must exert the pressure required to bring the problem under control.

The central problem is still a lack of information. The results of studies on working conditions should lead to campaigns for the training and education of artisanal and other workers. Research on agricultural workers exposed to pesticides clearly shows that lack of knowledge is at the root of most cases of toxic poisoning. This generalization could easily be extended to many other areas, such as the recycling of automobile batteries (lead poisoning), textiles (poisoning by dyes, some of which are carcinogenic), machinery (deafness due to excessive noise), postharvest agricultural activities (respiratory diseases caused by dust from coffee, cotton, etc.), to mention only a few.

Because researchers lack information on prevailing conditions in the industries of the Third World, it is often necessary in the South to repeat studies already carried out in industrialized countries. Worker participation in these studies appears to be an excellent way of speeding up the surveys and rapidly improving the conditions of Third-World workers. The technique of participatory research, albeit promising, nevertheless needs testing in a variety of professional contexts before it can be considered fully valid.

There is no doubt that occupational health and safety research must increasingly use methods drawn from anthropology and the social and economic sciences if it is to hope to improve the health of Third-World workers. Participatory research is only one example. Researchers (as well as donor agencies) must continue to work in an innovative and interdisciplinary fashion to improve the welfare of workers in the South.

Gilles Forget is Associate Director, Health and Environment, IDRC, Ottawa

Notes:

a) The generic term **pneumoconiosis** covers several diseases caused by inhalation of dust and inorganic fibres, generally of mineral origin (silica dust for silicosis, coal dust for anthracosis, asbestos dust for asbestosis). These diseases cause progressive and generally irreversible destruction of the lungs.

b) **Byssinosis** is a pulmonary affection caused by the inhalation of cotton dust, but the term is often used generically to identify several pulmonary diseases caused by inhalation of dust and vegetable fibres produced by textile or food processing. These diseases are also progressive and lead to a severe loss of capacity in affected individuals.

References

- 1) Forget, Gilles. (1991) *Pesticide Poisoning as an Occupational Hazard*. African Newsletter on Occupational Health and Safety, 1: 34–38.
- 2) *Leishmaniasis* (Peru), phase I, project #85-0143 sponsored by IDRC.
- 3) Christiani, David C. Durvasula, Ramesh and Myers, Jonathan. (1990) *Occupational Health in Developing Countries: Review of Research Needs*. American Journal of Industrial Medicine, 17: 393–401.
- 4) *Occupational Health Profile* (Egypt), project #86-0081 sponsored by IDRC.
- 5) Levy, Barry S. Kjellstrom, Tord. Forget, Gilles. Jones, Mark R.D. and Pollier, Laurence. (1991) *Ongoing Research in Occupational Health and Environmental Epidemiology in Developing Countries*. Archives of Environmental Health (in press).



WORKING TO STAY ALIVE

William Jakarisi has worked in the same chemical plastics factory outside of Harare, Zimbabwe, for more than 11 years. Putting up with working conditions thought to be "normal," he and his colleagues were exposed to a range of occupational health and safety hazards.

Machines were crammed into congested work areas, the heat in the factory was stifling due to poor ventilation, and protective clothing — the little of it that was provided — was often discarded because of the extreme temperature. Mr Jakarisi even saw fellow workers putting granules used for making plastics into their mouths to test for moisture. This was crudely known as "quality control," he says. "Workers in my factory didn't know the nature of the chemicals they were handling every day — or what these materials could do to their health."

Mr Jakarisi is one of several union shopfloor representatives being trained through an innovative IDRC-funded study to identify and help alleviate work-related health problems. The project's main goal is to develop a cadre of knowledgeable workers who can make reliable assessments of occupational hazards and spread the word about health issues in the workplace.

This quick, cost-effective monitoring of workplace safety by workers themselves is a novel research project for Zimbabwe, according to the project's leader Dr Rene Loewenson. "The research is both an interactive and participatory process," she says. "We need to educate workers on health issues so they can contribute valid and useful information concerning general conditions in their workplaces."

The project is beginning to train workers in the use of straightforward workplace checklists on such conditions as noise, temperature, light, and air quality. Results from these shopfloor surveys will then be assessed by researchers using



Harare's industrial areas: a mixture of sophisticated technology and unsafe working conditions can produce a wide spectrum of health problems.

equipment provided by IDRC: sound level meters, personal dust samplers, dry and wet bulb thermometers, lightmeters, and monitors for the testing of chemical fumes.

It was the Zimbabwe Congress of Trade Unions (ZCTU) that first introduced the idea of a participatory research project involving shopfloor workers in 1989. The ZCTU, an umbrella organization that has 29 affiliate unions and represents almost one million workers in the formal sector, was able to look at the findings of a similar IDRC-funded project in Mexico (see page 10). Researchers from Mexico were brought over to help in their research proposal.

The ZCTU also hired Dr Loewenson, formerly a lecturer in community health at the University of Zimbabwe, as part of a team of researchers teaching union workers in various industries about occupational safety issues.

Getting accurate information on working conditions in Zimbabwe has not been easy in the past. Government figures show that one worker is injured about every 5 minutes and there is an occupational fatality every working day. But official data have underreported the amount of occupational injuries and diseases that occur in the country each year. Consider the numbers: in Finland, a country with about half the population

of Zimbabwe and much better working conditions, there were more than 100,000 cases of occupational health problems reported in 1988, whereas in Zimbabwe the figure for the same year was only 17,000.

Dr Loewenson also points to the fact that out of the 17,000 reported cases of occupational health problems, a mere 100 were disease-related as further proof of the unreliable nature of official data. "I am an epidemiologist by training and anyone with even a cursory knowledge of occupational health issues knows that this ratio is far too low," she says.

Health issues are not just confined to the plastics industry either. Agriculture, the backbone of the Zimbabwean economy, is increasingly relying on the use of agrochemicals, like pesticides, to ensure high crop yields. Much of the equipment used for manufacturing and spraying these chemicals is of poor quality. Workers often don't wear protective clothing and are usually unaware of the potential health risks of their work.

In one instance, a farm worker pouring pesticides into a canister was found unconscious by a passing colleague. He was rushed to hospital where he spent several days in a coma. Despite complaining for several weeks of headaches and stomach cramps, he had to continue spraying in the field — alone.

Uneven Industrialization

Another development that has affected the health of workers is the uneven process of industrialization in the Zimbabwean economy. In Harare's industrial sector, sophisticated new technology exists side-by-side with crude, outmoded machinery. Each has its problems.

The poor quality of much of the equipment in small-scale, fledgling industries means that workers are left in a vulnerable position. "There is a 'fix-it' mentality in Zimbabwe and many other African countries," says IDRC program officer Firoze Manji. "People try to produce goods or offer services with the lowest level of machinery, often because of shortages in foreign exchange to purchase imported machinery. If the machinery breaks down, there is a chronic lack of spare parts, so people fix things themselves." The worker operating the temperamental machinery — frequently without safety features — is the one at risk.

In the relatively modern sand-blasting and spray-painting industries respiratory diseases are a major concern due to high levels of dust. But employers often downplay the threat and workers remain

uninformed on key health issues. Isaac Mudyanduruva, a research assistant with the IDRC project and a former worker in a fibreglass production plant, says that workers in these industries are commonly given milk by employers. It is good for the workers' nutrition but employers also contend that milk helps to counteract breathing problems posed by dust. "Of course there is no medical basis for this 'cure'," he says. "But most workers don't know this; they are in a vulnerable position."

Much of this vulnerability stems from the nascent nature of the labour movement in Zimbabwe. Although the ZCTU is the key research institution in this project, it has only been in existence since 1979. It has faced an uphill battle against corporate domination of wage and health issues, receiving only limited support from the Zimbabwean government. The long-term strategy of this project is to strengthen the capacity of the labour movement to negotiate with employers on the improvement of working conditions across Zimbabwe's formal sector. For now, however, the pendulum of control over occupational health issues seems swung firmly in favour of management.

In the official reporting of occupational accidents, for example, it is the employers who fill out injury report forms. The claim forms themselves only give brief space to explain why the accident happened, preferring to focus on the condition of the worker involved. "We have found that in most accident cases it is the worker who is blamed for being lazy or careless," Dr Loewenson says. "But employers fail to look at the environment in which the accident took place."

There are some signs that the Zimbabwean government is slowly recognizing the breadth of work-related health issues and the inefficacy of corporate self-regulation. The national social security authority, a parastatal organization overseeing health and safety issues in the country, was recently formed with three members from the Ministry of Labour, three from the ZCTU, and three from the Employers Confederation of



Harvesting crops by hand. Women often bring their children and must work for hours in uncomfortable positions.

Zimbabwe (EMCOZ). This body is one sign that the country is moving toward a more collaborative approach on matters of occupational health and safety.

Voice with Laryngitis

In addition, a new piece of legislation tabled in 1990, Statutory Instrument 68, sets out a series of regulations on health in the workplace. But Dr Loewenson is worried that the legislation is so vague and weakly enforced that it will become ineffective. "In a way Statutory Instrument 68 is not even a voice for labour in the occupational health wilderness: it is a voice with laryngitis," she says.

The legislation, for example, states there should be occupational health and safety committees at every workplace but does not specify how these should be set up or when they should meet, leaving that to the ambiguous legal wording of "as may



Farm workers are exposed to toxic chemicals from pesticide spraying.



Union leaders and health and safety officials at the opening discussions on current research.



On the construction site, even the lunch break at the canteen is risky!

be prescribed." Dr Loewenson says that where these committees do exist they are usually made up of members appointed by management and often don't meet for months on end.

The Ministry of Labour does not have enough manpower or resources to enforce many of the regulations set out in government legislation. There are a mere 12 factory inspectors for the entire country and they can only cover a fraction of the workplaces across Zimbabwe.

Researchers with the project realize that they cannot rely on government legislation or corporate self-regulation to change working conditions, so they are training workers to help themselves. Shopfloor representatives will learn not just how to identify health risks in the workplace but how to document them, what to do in the case of accidents, how to let workers know about their rights, and how to deal with management on occupational health issues. By 1992,

these shopfloor representatives will be collecting data on working conditions in key industries like chemicals and transportation and transferring that information to the ZCTU.

Occupational health and safety is not just an issue in Zimbabwe but also in many other African and developing countries. Indeed, the labour movement in Zimbabwe is relatively advanced when considering the situation in nearby countries like Zambia, Mozambique, and Kenya. "We hope that other countries will learn from some of our achievements and our mistakes," says Dr Loewenson. We are interested in regionalizing the information that will come from this study."

But the focus of the project remains on improving the occupational health situation in Zimbabwe's formal sector. And the task ahead is a daunting one.

"The issue here is about knowledge and empowerment over ignorance and vulnerability," says Dr Loewenson. "We know we have a large gap to fill when it comes to workers' knowledge about occupational health and safety. But despite the many obstacles, we feel we are taking that crucial first step down a long and difficult road."

For workers like Mr Jakarisi — and the millions he represents in Zimbabwe's workforce — this is hopefully a road that will end in improved working conditions and better health.

Craig Harris in Zimbabwe



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Harare, Zimbabwe



STEELING THEMSELVES WITH KNOWLEDGE



For 8 years José Manuel Gonzales has had to tolerate the heat, dust, and fumes that engulf his work station in the rolling mill at SICARTSA, one of Mexico's largest steel plants.

He says the partially state-owned company, located north-west of Acapulco in the port city of Ciudad Lazaro Cardenas, has never bothered to improve the harsh working conditions to which he has been exposed.

"It's the same as ever," says Mr Gonzales, who is swathed with toxic fumes during the production of steel plates. The fumes can cause eye irritation, respiratory problems, skin infections, and other ailments.

An IDRC-funded study on the health hazards at the steel mill was supposed to have changed all that. But a bitter 2-month strike in 1989, in which 1,900 members of Section 271 of the national mine and steel workers union lost their jobs, prevented the researchers from completing the final phase of the project. It was a frustrating end to a study that contributed greatly to workers' improved knowledge of health issues in the workplace. The study, conducted over a period of 4 years at the Siderurgica Lazaro Cardenas-Las Truchas (SICARTSA) steel mill with the participation of

some 830 union members, helped workers realize that the illnesses they suffered were not an inevitable part of the job but, in some cases, a result of management's negligence.

The methodology used by social medicine experts Cristina Laurell and Mariano Noriega of the Metropolitan Autonomous University in Mexico City bolstered the workers' confidence by getting them involved in the study and letting them identify the problems and find the solutions themselves.

Although Mrs Laurell and Mr Noriega were not able to design the computer program that would have enabled the union to monitor the health of the workers after the study, they still managed to write a user's manual and produce a video chronicling the study. The package, entitled *Conocer Para Cambiar* or *Knowledge for Change*, has since gained a lot of attention in Latin America. Unions from Mexico to Brazil to Spain are using the package.

And a Latin American information network has spread word of the study to academics as far as Chile. To Mrs Laurell, the educational package is an important achievement. "It's the first in the world," she says. "There is nothing like it." Juan Manuel Rangel Marcia, secretary of medical services for the 45,000-strong Mexican Electricians

Union, says the manual helped them organize their own study on occupational health, adding that they could not have achieved this without the package.

Variety of Illnesses

SICARTSA, which now employs about 5,000 workers, 4,300 of whom are unionized, produces about 1.33 million tonnes of steel a year or almost 17% of the national output. The steel comes in such forms as sheets, beams, corrugated rods, and heavy wire.

Ever since SICARTSA began operating in 1976, workers have suffered from a variety of illnesses, both mental and physical.

Guadeloupe Corona, who was the local union's secretary of health and security and helped instigate the study, says government inspectors had come on various occasions to investigate union complaints but nothing ever came of it.

Only after a 34-day strike in 1985 did company doctors admit that many workers were suffering from such things as respiratory diseases, skin infections, and chronic fatigue.

Mr Corona and the union soon realized that haphazard complaints weren't enough. "If we were ever to convince the administration, hard facts on occupational health problems

would have to be proven by a scientific study," he says. "So we started looking for someone who could identify the problems and know how to solve them."

Mr Corona met Mrs Laurell and Mr Noriega at a work safety conference in 1984 and soon began organizing union members for the study scheduled for the following year.

Mrs Laurell says unions often have difficulty convincing companies to improve working conditions because they lack the evidence to support their complaints. "In the greater part of Latin America — as well as in other countries — it is generally very difficult for a union to do an investigation on working conditions."

Accompanied by six colleagues ranging in specialization from psychology to social anthropology, Mrs Laurell and Mr Noriega set out to accomplish two things: first, to prove that the worker's perspective was as accurate as a scientific study; and second, to promote union participation by designing an educational package showing how to conduct occupational health studies without outside help. The results obtained from the study could be used by the union to reinforce demands for better working conditions in contract negotiations.

Harsh Conditions

Upon their arrival at SICARTSA, the two researchers were shocked by the harsh working conditions. Through the course of the study they would discover that the average worker suffered from a combination of four or five health problems, acquiring a new one every 2 or 3 years.

In the first phase of the study, the project leaders formed a group of workers for every one of the mill's 16 work stations. The coke plant is considered one of the most hazardous stations. Workers here are exposed to such things as coke gas, and coal dust because coal is baked for the blast furnace. Extreme heat and excessive noise only aggravate the situation.

A researcher was then assigned to each group to record the workers' descriptions of the station, the tools used and the equipment worn, the risks involved and the health problems incurred — as well as ways to improve working conditions.

The researchers drew a flow chart of each station based on information obtained from the workers. They also divided the health risks into five groups: physical, like noise and temperature; chemical, such as solvents, vapours, dusts, and fumes; physiological, such as strenuous activity and forced or uncomfortable positions; mental, like nervous tension; and unsafe working conditions with machinery and tools.

Mrs Laurell says the list was based on workers' observations rather than technical examinations. It was also limited to those risks affecting half of the workers or more, she said.

Mr Corona says management tried to disrupt the study by withholding employee medical files, threatening to fire those who cooperated with the researchers, as well as spreading rumours about union leaders. As a result, the number of people participating in the study dropped from 925 to 830, according to Mr Noriega. Mr Corona was forced to quit his job during a strike in 1988.

In the second phase, the researchers did a medical analysis of the 830 participants, which included a questionnaire asking them to describe their aches and pains. The results would help them judge the legitimacy of the workers' complaints in the first phase.

In a makeshift clinic at the union's headquarters, the researchers divided the workers by work station, illness, and seniority. They then took blood pressure, measured height and weight, tested hearing, and checked for eye disease. They also took X-rays, conducted respiratory tests, and sent blood and urine samples to laboratories for detailed analysis.

Mr Noriega says the number of work-related illnesses among SICARTSA employees was double the amount of occupational health problems reported by the government for the entire country. Although the

Mexican Social Security Institute (IMSS) reported an average of 2,000–3,000 cases of work-related illnesses across the country in 1988, some 4,000–5,000 cases of were found among workers at the steel mill alone.

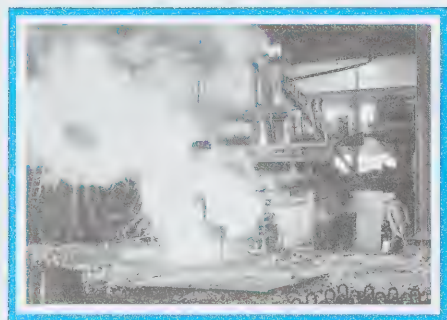
Of the five health risks, the physical, physiological, and mental were the most prominent in the workplace. More than 80% of the workers were exposed to loud noise, extreme heat, and toxic dust; more than 50% to awkward working positions and heavy labour; and more than 30% to such stressful conditions as dangerous work zones and strict supervision.

Among the 16 illness groups listed by the researchers, about 60% had chronic eye irritation like conjunctivitis, 56% had dermatitis or inflammation of the skin, and 49% had such respiratory problems as bronchitis and chronic laryngitis.

The researchers eventually held a meeting to present their findings to the workers. More than 3,000 workers came to hear what they had to say. "They were really interested to know what was wrong with them and what they could do to better the situation," Mr Noriega says.

The researchers also sent a copy of their findings to the company and, much to their surprise, SICARTSA didn't react in the expected aggressive manner. "They didn't say anything," Mrs Laurell confirms. "They didn't agree or disagree with the results of the study at all." Representatives from SICARTSA declined to be interviewed for this article.

After the acrimonious 1989 strike, many of the workers involved in the research lost their jobs, to be replaced in some cases by nonunionized workers. Today, the local union's executive committee is preoccupied with preserving their collective agreement on wages rather than fighting about working conditions in the mill.



Which, says the former union secretary for health and security, is too bad. "The government doesn't always recognize the interests of workers," says Mr Corona, who now works with a construction company. "Workers have to learn to represent themselves and participate in research on their work environment."

The project designed by Mrs Laurell and Mr Noriega was the first step toward that goal. It gave workers increased knowledge about their occupational health problems, empowering them with the tools needed to fight for a safer working environment. For the workers of SICARTSA in Mexico, subjected for years to hazardous working conditions and plagued by a variety of occupational illnesses, it is a step long overdue.

Gilles Castonguay in Mexico



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THE HIGH PRICE OF A GOOD CUP OF COFFEE

At this coffee-hulling factory, 7 kilometres outside of Kampala, Uganda, the constant coughing and rhythmic wheezing of workers are among the regular sounds of a typical work day. Without protective equipment like face masks, goggles, and gloves, workers here toil long hours in a plant with little ventilation, breathing in dusts produced by the processing of coffee beans. The working conditions here are poor but they are likely no worse than in the dozens of other coffee-hulling and processing plants across Uganda.

Agricultural products supply nearly all of Uganda's foreign exchange, with coffee alone accounting for more than 90% of the country's exports. The coffee industry is a major source of employment in Uganda: the Coffee Marketing Board (CMB) depot and processors themselves employ about 20,000 people. Coffee is grown in 16 of the country's 36 districts with an annual average production of between 100,000 and 150,000 tonnes.

There is no doubt that coffee is important to Uganda's economy: what is less recognized is the potential health risk for coffee workers who can easily develop respiratory diseases.

Dr D.K. Sekimpi, former chief of the Occupational Hygiene Department with Uganda's Ministry of Labour, recently concluded an IDRC-funded survey of workers in the coffee industry that assessed the occupational hazards of the sector. He found that the "health of many coffee workers is poor due mainly to the failure of owners of hulling factories to comply with basic safety regulations."

These regulations, set out in the 1965 Factories and Public Health Acts state, among other things, that "where in any factory workers are employed in any process involving exposure to dust, fumes or to any injurious substances, suitable protective equipment, including suitable gloves, footwear, goggles and head coverings, shall be provided and maintained for the use of such workers."

Since protective clothing is not often supplied, workers are exposed to a range of occupational health problems including chronic coughing, breathing difficulties, chest pain, rhinitis — an inflammation of the mucous membrane of the nose — and conjunctivitis — a form of eye disease.

To carry out his research Dr Sekimpi examined the working conditions in 22 coffee-hulling factories and surveyed the health of more than 1,000 workers. He used a control group of 128 workers who were not exposed to coffee dusts to compare with the exposed workers. The results were hardly surprising for anyone who has worked in the industry.

Dr Sekimpi found that the coffee dust sampled at the factories contained fungi, bacteria, and bacterial toxins, all substances potentially dangerous to the human respiratory system. More than 92% of workers tested were exposed to dust levels greater than 2 mg/m³. These conditions resulted in above-normal rates of airways disease among coffee workers.

Occupational airways diseases were diagnosed in 9.3% of coffee workers compared to only 3.9% among workers not exposed to coffee dusts. And, according to Dr Sekimpi, all respiratory and allergic symptoms of cough, breathlessness, chest tightness, rhinitis, and conjunctivitis were significantly greater among coffee workers than nonexposed workers.

REPORTS

The reasons for this high incidence of airways diseases among coffee dust workers are easy to pinpoint: high dust levels, lack of protective equipment, old machinery, and poor design and ventilation in factories. Certain types of coffee dust pose a greater danger to workers. The arabicca coffee dust is more likely to be associated with airways disease than robusta coffee dust. In addition, tobacco smoking increases the risk of airways disease among coffee workers. Thus, workers who handle arabicca coffee and who smoke are at greatest risk of having respiratory problems.

It is also clear from the study's findings that the exposure of workers to high levels of coffee dust is the result of poor factory design and engineering, old machinery, and little protective equipment. To help minimize airways diseases Dr Sekimpi submitted a list of recommendations to the Ugandan government concerning the coffee industry.

He said the control of dust in coffee factories should be kept to a limit of 0.2 mg/m^3 through better machinery and engineering design. Dr Sekimpi pointed to newer factories in the Kampala area, which have reduced the amount of dust to low levels of 0.6 mg/m^3 , as proof that changes can be made.

Workers who develop occupational airways diseases caused by coffee dusts should also be covered by compensation, he said. Currently, these workers are not given financial assistance because of the difficulties involved in proving that illnesses are work related. Smoking should be discouraged among coffee workers by informing them of the increased risks of combining cigarette use with long-term exposure to coffee dusts.

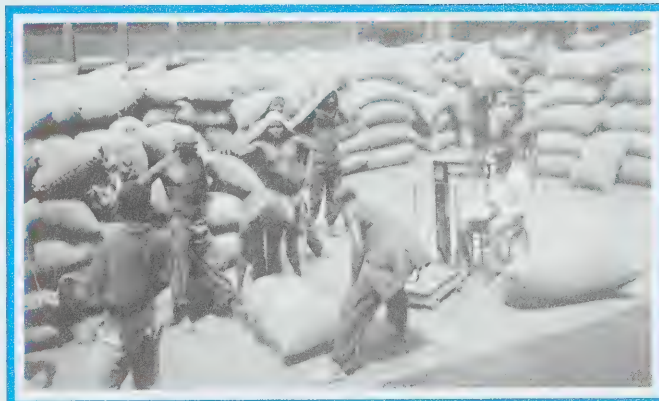
And, Dr Sekimpi said, more studies should be carried out on the possible effects of contaminants in coffee dust such as fungi, bacteria, and bacterial toxins.

For workers who handle coffee husks to burn tiles and bricks, these recommendations are not merely good intentions but urgent matters of well-being. Workers at factories in the Kampala region complain of eye problems caused by fire from the coffee husks and say they have constant breathing problems.

Dr Sekimpi said the working conditions in these factories, as documented in his study, merit attention from the government. He is hoping that the project's findings will put pressure on coffee companies to provide their workers with protective equipment. Indeed, the Coffee Marketing Board in Uganda has recently made orders to import masks for its workers.

It is one small sign that change may be on the way for Uganda's beleaguered coffee workers.

Moses Seruwagi in Uganda



Daily exposure to dust in the working environment is common in the coffee industry.



Current working conditions in a clay factory on the outskirts of Kampala.



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MONDAY FEVER

Textile workers in the dusty cotton mills of Guangzhou, the largest city in south China, will soon know how they are affected by an occupational disease called byssinosis, thanks to an ongoing study by Chinese health specialists.

Byssinosis is a chronic industrial disease associated with the inhalation of cotton dust over long periods of time. Feeling tightness in the chest or shortness of breath, byssinosis victims suffer from weakened lung functions accompanied by dry cough and phlegm. Because symptoms usually occur on Mondays after the week-end break, byssinosis is also known as "Monday Fever," according to Dr Jiang Chao-Qiang, the deputy director of Guangzhou Occupational Disease Prevention and Treatment Centre.

Health hazards caused by dust in textile mills have been studied by scientists for hundreds of years, and more than 20 countries have been monitoring byssinosis in their cotton plants. But China's situation is particularly serious.

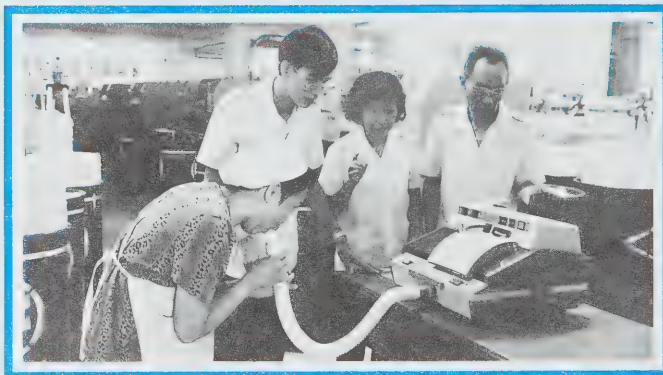
China has the world's largest cotton textile industry, with a workforce of 8 million people and a total amount of processed cotton of over 4 million tons (1990). The sheer number of people at potential risk from byssinosis is far greater than in other areas. And studies of this complex disease in China have started well after initial studies in other countries. The result: to date, there are no unified standards for diagnosing the disease as China lags behind other industrialized countries in measuring the environmental hazards that can cause byssinosis.

There are, however, signs of change on the horizon for those at risk. Dr Jiang, who has been working on byssinosis for more than 20 years, says work in the field has accelerated in recent years thanks in large part to an IDRC grant.

From 1969 to 1985, he carried out one of the first surveys of cotton mills in Guangzhou, a city with 34 mills employing more than 30,000 workers. The results were hardly surprising. The density of cotton hemp dust in most of the mills was far above the allowable limit suggested by the World Health Organization. Indeed, the density of the dust ranged as high as 27 mg/m^3 , well over the 10 mg/m^3 conventionally allowed in China. Clearly, something had to be done.

After taking part in an international symposium on the disease in 1986, Dr Jiang had ideas about what to do with byssinosis. "Another survey was the first step," he says. "But this time it had to be more scientific and comprehensive." In 1987, he put forward a proposal called "Research on Byssinosis in Guangzhou, China," which was subsequently funded by IDRC.

The research project looked at a number of factors related to the disease including: the byssinosis incidence rate in Guangzhou; the presence of bacteria and fungi in workshop air; how the disease is related to age, sex, length of service, and type of work; the relationship between byssinosis and various dust types; and the relationship between "Monday fever" and smoking.



Lung-capacity tests at Guangzhou No. 1 Cotton Mill.

Dr Jiang says that by carrying out research in these areas "we'd be able to lay a scientific basis for revising the standard of cotton dust allowed in textile shops in China with a view to protecting the health of workers."

And if the research results are any indication, protecting the health of workers is very much at issue. In October 1990, data collected from more than 480 workers in the Guangzhou region indicated a byssinosis prevalence rate of greater than 7% and a 14% prevalence of respiratory irritations.

To compile this data, a total of 2,600 workers were selected for the research project. The general health and respiratory conditions of 1,300 workers from three textile mills in Guangzhou were compared to 1,300 workers who had little contact with cotton dust: garden-keepers and clock factory workers. On-spot investigations were carried out in mills involving physical check-ups, chest X-rays, examinations of lung function, collection of airborne cotton dust in working areas, and testing for bacterial toxins, which are likely responsible for the symptoms of byssinosis.

Although data comparing the control groups are still being collected, initial results show that the health — particularly respiratory problems — of textile workers is worse than in other factories and workplaces. The research project is expected to be completed by June of 1992 when the final report will be read at an international symposium on cotton dust in Guangzhou. Researchers are hoping that the results will stir up some attention to the often ignored problem of byssinosis and spur some action from the Chinese government.

For millions of Chinese textile workers, this research project represents the beginning of earnest efforts to recognize and measure the occupational hazards of cotton dust and the first step in a process that can ultimately lead to a safer working environment.

Huang Shaomin in China



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Guangzhou Occupational Disease
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OCCUPATIONAL POISONING



Not only are farmers exposed to the dangers of pesticides so are the workers who manufacture them.

A recent study of several Egyptian pesticide factories found that about 40% of the workers had problems related to pesticide poisoning, ranging from asthma to enlarged livers.

"The results were appalling," said Dr Mahmoud Mohamad Amr, the director of the National Centre for Clinical and Environmental Toxicology at the University of Cairo.

Dr Amr was the leader of an IDRC-funded study that examined the occupational hazards for workers in Egypt's growing pesticide industry. The project's main goal was to improve the health and safety standards in these factories.

Last year, Egypt used 55,000 tons of pesticides in the agricultural and public health sectors. This amount represents almost 2% of the world's total production of pesticides. To reduce its dependence on expensive chemical imports, Egypt has developed an active manufacturing and formulating industry, producing 5,000–8,000 tons of pesticides annually.

Many of the factories, however, are unsafe and, workers are not suitably trained or equipped to handle toxic materials.

Dr Amr found that conditions in the factories subjected workers to many health risks. Various instances of inadequate ventilating systems, poor standards of hygiene, and open machinery were documented. Workers did not wear protective clothing and had little training or education in handling pesticides.

He estimated that 15–20% of the workers he examined would not reach the average Egyptian life expectancy of 65 years — a statistic he related directly to the chronic effects of pesticide poisoning. He found workers suffering from such ailments as skin inflammation, bronchial asthma, liver damage, psychological disorders and polyneuritis — a degenerative lesion of nerves that can result in the loss of reflexes and even paralysis.

Once the study was completed, Dr Amr decided to take the results to the public to alert them to the dangers of pesticides.

"We felt the issue at hand was not just that a number of people were getting poisoned by mishandling these chemicals," he said. "It was much more serious than that. The potential damage to human health, the environment, the loss of millions of days of work and productivity and the increase in the health bill to society were all at stake."

The research team mounted a mass media campaign and held meetings and workshops to educate the public about using pesticides safely and effectively. They advised plant managers on how to improve factory conditions and undertook some worker training. Physicians and paramedics were taught to diagnose and treat poisoned patients, and material on pesticide hazards was included in the medical school curriculum.

The support of the Egyptian government was crucial to the success of the campaign. The government issued several official orders related to pesticide use and studied and evaluated pesticide legislation. Other achievements included the founding of various national and regional pesticide organizations and the establishment of the first pesticide laboratory in Egypt.

Most importantly, however, Dr Amr said that public awareness has increased: "I believe that every one of the 47 million people (of Egypt) are now at least familiar with the problem."

The pesticide study entered into a second phase this year. Dr Amr and other researchers are currently studying pesticide exposure among agricultural workers with the aim of developing better health protection regulations.

Jennifer Pepall in Ottawa



Mohamad M. Amr
Professor
Kasr El Aini Faculty of Medicine
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Cairo, Egypt



WINDS OF CHANGE IMPROVE TUNISIAN AGRICULTURE



At El Fahs cooperative farm in Tunisia, farmers prepare the ground for windbreak planting.

People often think that development research means using high technology and sophisticated machinery to improve farming in the developing world.

But a project in Tunisia has demonstrated the value of using and improving time-honoured farming practices, in this case, the use of windbreaks along fields. One could say it is an ill wind that blows no good.

The windbreak project is headed by Jélila Benzarti, a climatology specialist with Tunisia's Institut National de la Recherche Agronomique, although a large team of agronomists, foresters and other scientists have also been collaborating on the study. Through numerous surveys across the country's main agricultural regions, the researchers found that the majority of windbreaks were poorly installed and badly managed. Some farmers have not bothered to use windbreaks at all in the false belief that they take up too

much land. Even those who lined trees along their fields often put them too close together, planted all the same kind, or used types inappropriate for local conditions.

Said Mme Benzarti, "People only have a limited knowledge of the subject. For many farmers a windbreak is a bunch of trees that you plant in a row that should grow and take care of themselves. We found it to be much more than that."

Because of its position on the Mediterranean, with coastline exposed to the sea on two sides, Tunisia gets more than its share of winds. Whether whipping down from polar regions or up from the Sahara, winds are present at least 8 days out of 10 in this northern African country.

For that reason, many farmers had been using windbreaks long before this study came along. But no one had ever bothered to prove why windbreaks are beneficial and, beyond that, to look at different types and see which is best.

The cost of the windbreak project was shared by the Tunisian Agriculture Ministry and Canada's IDRC. Work has been coordinated by Mme Benzarti with the additional involvement of Tunisia's Institut National de la Recherche Forestière and Institut des Régions Arides.

By comparing wind-protected test sites with unsheltered ones, researchers proved conclusively that windbreaks enhance production. Tomato crops, for example, were 37% higher when sheltered, beans went up 17%, and some forages doubled.

But the more difficult task was finding out what type of tree — or combination of trees — worked best and under what conditions.

With the best of intentions, some farmers have for years planted rows of cactus along their fields, keeping the wind out, but nearly suffocating crops as a result. Many farmers do not realize that windbreaks are meant to do what their name says — break the wind, not keep it out completely.

Building a better windbreak means incorporating such factors as temperature, prevailing wind direction, type of crop grown, the lay of the land, and economic needs of the farmer.

"The best conclusion is that there is no one type of windbreak, no magic recipe," said Ali Albouchi from the forestry institute. "There are a number of things that must be assimilated and understood." Although the best windbreak has to be tailor made, the researchers have found there are some common factors to keep in mind. Windbreaks should be made of a variety of trees to protect against the whole system being wiped out by pests.

It is better to use a mix of species like cypress, eucalyptus, and acacia. Some grow more quickly than others, providing almost immediate protection. Others, although taking longer to grow, have longer life spans making them more useful in the long term. A better windbreak also incorporates low, medium, and high trees. When planted as future windbreaks, tree seedlings should be protected by plastic to limit loss of water and eliminate weeds and pests. Farmers realize the importance of watering their crops, but should not forget the importance of watering the windbreak, researchers with the project point out.

Farmers also have to learn to maintain the windbreak as they would any other crop. Trees cannot simply be left to grow wildly. Often the lower branches must be trimmed to encourage higher growth and the whole row will need cutting back from time to time.

During the second phase of the project, three demonstration centres were created to examine different types of windbreaks at Chbika, El Fahs, and Gabes. Tests were conducted on mixing species, the best distance between trees and rows, and on the impact of air temperature and evaporation. The results of all that research can now be applied to specific cases.

Because many farmers are concerned about the loss of farmland to windbreaks, another research goal was to find out if the benefits of wind protection exceeded the cost of buying trees and the loss of productive land.

"Before, it used to be considered a lost space because it didn't produce anything," said Mr Albouchi. "It improved production, but wasn't considered a useful element in itself."

To enhance their viability, small forage plants can fill out the bottom of the windbreak and later be used for animal feed. Medical plants or spices can also be used. Trees planted as windbreaks should be seen as a resource for use as firewood or for the production of charcoal.

With these findings under their belts, the goal of the researchers in the project's third phase is to get the message out not only to farmers but also to government technicians (those doing the "popularization") working in the field.

Three advertisements were broadcasted regularly on Tunisian television and a 20-minute video explaining windbreaks was shown on television and then made available for use by fieldworkers conducting seminars with farmers.

Teams of fieldworkers, specially trained in the techniques of windbreaks, are now charged with helping farmers to help themselves.

One idea is to use the farmers themselves in the television and radio spots. "We want to have a farmer talk about these things because sometimes a technician talking about them is not so well received," Mme Benzarti said.

Flyers sent out to farmers were written in clear, simple Arabic and were illustrated with drawings. Radio programs were produced and aired at 6:30 a.m. to catch farmers who wake up early. There have also been a series of farm visits, workshops, and seminars that will continue over the next year with follow-up sessions later to check on progress.



Jélila Benzarti and Ali Albouchi on the site of El Fahs cooperative farm.

"We're putting all our bets on this because the basis of getting the message across is having fieldworkers who know the subject well and can talk to farmers about it," said Mme Benzarti.

With the end of the project in view, she is pleased with the results so far. "Research on windbreaks could continue forever but our findings have helped us achieve a much better understanding of the subject and brought a lot of improvements in windbreak techniques — especially compared to what was there before."

She also commended IDRC for its role, "one of the great advantages of cooperating with IDRC is that they do not impose anything. In fact, on the contrary, they are in favour of maximizing the utilization of local talent and this is precisely what we are striving to do. So, every time we need expertise, we look for it in Tunisia. We need to have faith in ourselves and rely on ourselves."

Allan Thompson in Tunisia



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CIEPLAN IN CHILE

THE PATH TO POWER

In September of 1973, Chile's social fabric was ripped apart when a military coup led by General Augusto Pinochet brought the country's history as a democratic republic to an abrupt halt. This uprising ushered in an era of dictatorship that was to last 17 years.

Throughout this dark period of Chilean history, democracy, free debate, and the equitable distribution of resources were all low priorities on the agenda of a government with a well-documented record of human rights abuses. For the people of Chile, this was a time many would rather put behind them.

But there are signs of change in this coastal South American country. A special plebiscite in October 1988 gave Chileans an opportunity to reject Pinochet's claim to power. Presidential and congressional elections took place a year later, resulting in a clear-cut victory for the opposition coalition, known as the Concertación Democrática.

The new government took over in March 1990 and, despite formidable obstacles, President Patricio Aylwin has succeeded in achieving reforms that even members of his own party had thought impossible.

How did this process of reform come about and who are the people that made it possible?

In the fields of economic and social science research, much of the credit goes to the members of the Latin American economic research corporation, Cieplan (Corporación de Investigaciones Económicas para Latinoamérica). This organization acted as a kind of think tank where a team of scholars headed by Alejandro Foxley, now the Minister of Finance, worked throughout Pinochet's regime to research and examine problems of underdevelopment and authoritarianism in Latin America. It was no easy task.



Chilean President Patricio Aylwin accompanied by the Minister of Finance during a press conference.

Following the overthrow of President Salvador Allende in 1973, the new government assumed control of the entire state structure. All opposition was crushed and thousands of the deposed government's supporters were killed or forced into exile.

In university circles, academics were persecuted, social and economic research centres were shut down, and the military intervened in the universities, often appointing its own leaders as university presidents. Any suspicion of dissent was pounced on and punished — opponents were expelled or forced to resign from their jobs.

These developments were not unique to Chile. The same events occurred in other Latin American countries ruled by authoritarian governments in recent decades. Chile's case does, however, have some unique aspects, particularly in the resilience of its academic community and its willingness to carry on research in trying circumstances.

Basic Mission

The advent of Cieplan was no accident. It was founded by researchers at the national planning research centre (Centro de Estudios de la Planificación Nacional) at Chile's Universidad Católica, directed by Alejandro Foxley. They were forced to

leave that institution in the wake of the military coup and, anticipating a lengthy period of rigid dictatorship, set about establishing a centre that would become a refuge for independent work. The work was to be done by a highly select group of academics who, like themselves, were economists but viewed themselves as social scientists committed to achieving a deeper understanding of a situation beyond details and figures.

Soon after Cieplan was started it established its basic mission: to reflect on the process of events in Latin America and formulate potential solutions to the problems of development and authoritarianism.

In the atmosphere of persecution and repression, it was difficult to do academic research. "The dictatorship, in the most general terms, disturbed the freedom and tranquillity required for academic work," Joaquín Vial, a member of Cieplan's current board of directors, notes. "From the research perspective, it made access to official information difficult and also meant that manipulated and falsified data and statistics were provided. The most visible sign of the repression was the absurd banning and seizure of a book despite the fact that its contents had already been published in the media."

Pinochet's government's refused to give Cieplan permission to operate legally, and research projects were subsequently developed with international financial support. IDRC was one of the organizations who provided the funding that was crucial to Cieplan's existence.

"The support which IDRC provided throughout the 1980s for our macroeconomic research studies enabled us to develop instruments and criteria for formulating sound macroeconomic policy," says Mr Vial. "Its contribution, moreover, enabled us to track the economic situation, a vital task which allowed a group of researchers to observe events and develop tools for monitoring economic developments in great detail. In addition to forming opinion, it thus facilitated the transfer of power to informed people who were prepared to assume the responsibility of governing the country."

Instrument Makers

In this context, one of Cieplan's most important roles was to produce well-researched studies that would provide an accurate record of Chilean economic trends. They compiled basic statistics on inflation, social spending, national accounts, employment, and wages. Cieplan even brought about a complete revamping of the consumer price index (CPI) when researchers discovered that this indicator had been falsified by the government during the crucial period between 1975 and 1977.

There was also ongoing analysis of such issues as determining factors in the balance of payments, the process of setting prices and wages, the operation of the labour market, the financial system, and an assessment of the tools used for monetary and fiscal analysis.

Another direction of Cieplan's studies was the systematic analysis of conflict resolution in other countries. Research was conducted with a view to studying solutions applied to conflicts that might suggest lessons for Chile and Latin America.

Among the hundreds of books, papers, and research reports produced by Cieplan, experts point to the importance of "Políticas Macroeconómicas" (macroeconomic policies), a document that represents the fruit of years of study on a range of economic and development issues common to Latin America and is considered "a Latin American classic which contains the best answers from the South to the North based on scientific analysis."

The relationship between risk and the development of Chile's political process deepened in the 1980s, when the political and economic crisis prompted outbursts that were suppressed with extreme severity by the dictatorship. Under these circumstances, nongovernmental organizations like Cieplan became meeting places where intellectuals and social and political leaders could exchange ideas on possible solutions to the country's problems. They thus helped build the bridges that were necessary and paved the way for the process that culminated in the emergence of Concertación Democrática in 1988.

One former member of Cieplan, now a senior government official, explained that "the economy was a battle ground and an area where great debates developed, but in addition to the criticism we also assumed that it was necessary to think about a new government."

Joaquín Vial adds that "the basic thesis underlying many of the ideas at Cieplan and later adopted by the Concertación Democrática was that areas of consensus had been produced in Chile — despite or perhaps as a result of the dictatorship — that were much broader than those that had existed historically. There was a common yearning among the people for stability and economic progress and a shared desire to salvage the positive achievements of the military regime and integrate the traditional values of egalitarianism and solidarity," he says. "Our traditional values apparent in such fields as education, health, and forecasting could perhaps

Cieplan in Government

Before Chilean President Patricio Aylwin announced the make-up of his Cabinet, it was taken for granted that his Minister of Finance would be Alejandro Foxley, Chairman of Cieplan, and that this research centre would also provide the individuals who would assume major responsibilities in the economic and social fields. In addition to distinguished academic credentials, all of them have worked for years preparing the policies, programs, and instruments for the process of restoring democracy.

The following members of Cieplan were in the end called upon to fill the following positions in government:

- **Alejandro Foxley, Minister of Finance**
- **René Cortazar, Minister of Labour and Forecasting**
- **José Pablo Arellano, Budget Director**
- **Pablo Pinera, Deputy Minister of Finance**
- **Ricardo French-Davis, Research Director of the Central Bank of Chile**
- **Nicolas Flano, Chile's Executive Director at the World Bank**
- **Manuel Marfan, Advisor to the Ministry of Finance and Coordinator of Macroeconomic Policy**
- **Mario Marcel, Research Director of the Budget Department**
- **Ignacio Walker, Advisor to the President's Office**
- **Claudia Serrano, Head of Social Services for the Municipality of Santiago**
- **Esteban Jadresic, officer in the Research Department of the Central Bank**



POPULARIZING SCIENCE IN NEPAL

be integrated with some of the positive aspects of the dictatorship such as respect for the private sector, increased efficiency, and competitiveness."

The development of these thoughts in a manifesto called "El consenso económico es posible" (economic consensus is possible), was key to ending the dictatorship and is reflected in the program now being implemented by the current government. It was published under the signature of Cieplan's most senior members in September 1988, a month before the plebiscite called by General Pinochet.

The text included a revealing, sincere analysis of the positive and negative achievements of the military regime and called for the building of a new concept, that of consensus. Its introduction puts it this way:

"We the economists who have put our names to this document are linked professionally to Cieplan and affirm that, in our judgement, a consensus for democracy is possible not only in political terms, but also in economic and social terms.

There are only two basic preconditions for this economic and social consensus to crystallize. First, that those who subscribe to it share the view that the authoritarian cycle in Chile has now run its course and that a new political era of full liberty and democracy must now begin. In order to achieve this, a change in the country's leadership is necessary.

The second condition is that those who support this economic and social consensus are willing to be generous in accepting the advances and contributions made to the development of the country and its economy, both past and present, by the various groups which make up the country. A new era marked by the will to achieve consensus cannot begin if we deny the possibility of synthesizing the experiences and lessons that we as Chileans have learned from the history of the conflicts that have left their mark on recent decades."

Richard Vera in Chile



A recording of the Science and Technology program on Radio Nepal.

The scientific discoveries and innovations that are rocking the world today are often unheard of in Nepal, the Himalayan kingdom in South Asia known more for its snow-covered mountains, raging rivers, and wild beauty. Isolation has had a profound effect on the population of this land-locked country — more than 60% of the population live below the poverty-line and 65% are illiterate.

Far from being unconnected, these two statistics are the basis of an IDRC-funded study by the Royal Academy of Science and Technology (RONAST), called "Science Popularization." Researchers with the project realized that science and technology, if properly utilized, can provide answers to many of Nepal's development problems. The trick was how to disseminate knowledge of scientific developments in a country where rugged terrain separates communities and whose population remains trapped in the world of illiteracy and superstition.

RONAST took on the challenge in 1985 by launching a novel, 26-month pilot project designed to spread the word of science and technology through existing channels of mass communication. The project had fairly modest beginnings.

It started with RONAST inviting Nepalese media practitioners, publishers, and editors to a meeting to get their views on how best to disseminate information about science. The participants from the media recommended in one voice that the project should make available information packages on science and technology as they "were not in the position to write science features themselves nor could they hire the services of specialized journalists," says Gokul Prasad Pokhrel, a seasoned journalist who headed the Science Popularization project. The need thus emerged for well-focused and simplified information packages on contemporary science and technology issues that were both relevant to the Nepalese people and available to mass media outlets. In 1986, RONAST Science

Features — a bi-monthly publication — was created to bridge this information gap. Free of cost, it was made available to more than 100 major newspapers published in different cities of Nepal, and the evidence is that the newspapers use it. "Had it not been for the Science Popularization project readers would not have found any science information in our weekly paper," says Jaya Prasad Dahal, editor and publisher of the Gaurab and Nepal Khabar weekly published in Biratnagar. Mukunda Parajuli, the editor of a new weekly called Janamancha says "the credit for more science information in our newspaper definitely goes to the Science Popularization project." Even in the remote far western region of the country, the editor of Janmat weekly wrote a special editorial highlighting the role played by the project and the science features service.

"It is comforting to note that more and more newspapers are providing space to science information made available by us or produced on their own," says Mr Pokhrel. Indeed, the science features service of RONAST has become a model for many newspapers and they have started publishing special columns and articles following the pattern of our features, he adds.

There is mounting evidence that this increased availability of science information has had an impact on the general public. "A story in the newspapers on the role of eyebanks in corneal transplants brought a wave of eye tissue donations from the general public," says Banbarilal Mittal, a secretary with the Nepal Eye Foundation.

Researchers with the project quickly realized that, despite the success of the newspaper science features, there were people in remote areas who had little or no access to printed material. Radio was used to overcome this hurdle and a 15-minute weekly Science and Technology Radio Program, aired on Radio Nepal, was created as the second component of the project. Studies have shown that 55–65% of the population of Nepal has access to radio.

The program, delivered in a magazine-type format, was comprised of general knowledge on science, the latest news from science labs around the world, interviews with various scientists, features on scientific institutions, and a radio quiz question-and-answer portion. The radio quiz program, broadcast on the last Saturday of each month, quickly became a favourite of listeners. More than 400 letters from 75 out of the 76 districts in Nepal were sent into researchers and broadcasters working on the radio program. Letters were even received from some neighbouring states of India.

An evaluation of the radio program by a consulting firm found that out of 14 similar programs being aired by Radio Nepal, the science feature was the third most popular.

For Shanta Bahadur Gurung, a key figure in the evaluation of the pilot project, the success of RONAST's newspaper science features service and its radio program are all signs that the project is heading in the right direction. "The overall evaluation of the project shows encouraging signs that much of the information provided by RONAST is trickling down to the target group," he says. Mr Gurung was the coordinator of the team from the Centre of Education and Development Administration (CEDA) that did a formal evaluation of the Science Popularization project.

Despite the popularity of these activities, there are still obstacles to overcome and room for improvement, Mr Gurung adds.

One strong limiting factor to the growth of science information in Nepal is the lack of infrastructure in place to train science journalists. Developing the skills of science writers and broadcasters has become an important aspect of the project's activity. For the first time in Nepal two specialized training workshops on science reporting were organized for journalists in the project's first phase. In all, 40 science writers and broadcasters attended and benefited from the workshops.

Another obstacle facing the project is the lack of interest in science-related issues among young journalists; many find the subject cut-and-dry compared to political reporting. "The country is in dire need of trained science journalists," says Jyoti Vaidya of the Matrabhoomi weekly who himself participated in the science writing workshop in 1986. "We want to start a regular science column and are looking actively for science journalists but there are none." Other editors of newspapers across the country express similar opinions.

The obstacles facing researchers with the Science Popularization project are formidable but they say at least the groundwork for a greater understanding of important scientific information has been laid. "With our news feature service and the continued success of our radio program, the situation for science popularization is a lot brighter now than it was in the early 1980s," says Mr Pokhrel.

Prakash Khanal in Nepal



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ECONOMICS OF AGRICULTURE IN LESOTHO

"A pick and a spade are my friends and a wheelbarrow is my sister." So says Mr Black Jesus, a fruit and vegetable farmer in the Berea district of Lesotho, a tiny mountainous country surrounded by South Africa.

When Mr Jesus began to farm here in 1981, he became a member of the Berea Fruit and Vegetable Cooperative, subsequently being elected as its leader. The Co-op grew from seven to its currently 60 members.

With funding from a Canadian NGO, the Unitarian Service Committee of Canada, the Cooperative built a \$115,000 cold storage facility to store and market their produce. The facility opened in late 1988, only to close less than 3 months later.

The answers to why it closed are part and parcel of the agricultural marketing system of Lesotho. According to Mr Jesus, Lesotho's government granted a foreign businessman a license to import cheap produce from South Africa to sell in direct competition with local producers. The Co-op members just could not compete.

"Our goods rotted in the cold storage while the Boers sold their cheaper, subsidized produce here," adds Mr Jesus. "As producers our main problem is this country's lack of effective agricultural marketing systems."

Occurrences such as these have prompted researchers at the National University of Lesotho to formulate a research proposal studying agricultural marketing problems in this southern African country. This proposal, submitted to IDRC for funding, led to a cooperative agreement between the Institute of Southern African Studies (ISAS) of the National University of Lesotho and the Agricultural Economics Department of the University of Saskatchewan.

There have been two phases to the project. Phase one, which started in 1984, was codirected by Dr Michael Sefali of ISAS and Dr Gary Storey of the University of Saskatchewan. Mr

Brent Swallow served as project leader for this initial phase, with research assistants Malijeng Ngqaleni and Limpho Sopeng. The project's second phase was under the direction of Dr Gwendoline Malahleha, the director of ISAS.

The overall aims of the project were to highlight problems and weaknesses in current marketing systems, conduct research, and recommend improved policies to the government's Ministry of Agriculture. Marketing policies for



use in the vegetable and fruit, livestock, wool and mohair, and dairy industries were developed by the project team.

Dr Malahleha, emphasizes that "there is a need for these kind of studies, not only because of Lesotho's weak economy, but primarily because of our competitive neighbour (South Africa). We need to know where our strong points are to compete effectively."

The project's researchers also say the need arose because billions of dollars in aid were invested in Lesotho through projects highlighting production. High production with no means of distributing produce has rendered many large-scale projects complete failures.

Initial research in the first phase focused on developing marketing policies for vegetables, grains, and livestock and livestock products and byproducts (milk, wool and mohair, and skins and hides).

In this phase, four Basotho researchers received research training and completed Master's degrees in Saskatchewan. All four student theses focused on agricultural problems in Lesotho. Dr Storey at the University of Saskatchewan says that "student education and professional training are more meaningful when the student can work on a research problem that he or she has a feeling for and understands." Unfortunately, he adds, not all international project funding allows for this.

Of these four students, None Mokitimi and Motsamai Mochebelele have taken over as the project's principal researchers in the second phase, which expands on previous research while incorporating an analysis of household economics and marketing institutions.

Dr Malahleha stresses the significance of local administration of the project. "The researchers can communicate with farmers and producers in their own language, with the same cultural understandings," she says. "At the same time, the researchers are improving their own analytical skills."

Research methodology is straightforward. Project researchers conduct meetings and interviews with staff members of the Ministry of Agriculture to determine specific marketing problems. A steering committee composed of the project team and government officials from the agriculture ministry and the central planning and development office chart the research agenda.

The project researchers formulate problem statements and conduct research. Seminars and workshops are scheduled to discuss research findings. Later, the findings and recommendations are published for government examination and dissemination through the Institute of Southern African Studies documentation centre.

Says Dr Malahleha, "It has been a project in which our academic institute is able to work closely with the government. This has enabled the project to address relevant marketing problems and make more of an impact and, importantly, it has been one where researchers can say the truth even if it is not as the government perceives it."

The project's research findings generate statistics that are now used by aid organizations and Lesotho's government.

The research team has identified major problems that result in poor agricultural marketing in Lesotho. These include the absence of set standards in grading and packaging, the lack of effective marketing boards and institutions, and overwhelming competition from South African farmers that has resulted in the country's dependence on imported goods.

Inadequate or nonexistent education and training for farmers and the overall failure of development schemes to be long term in nature have also worsened the marketing crisis.

There may be hope for Mr Jesus, his cooperative, and other produce farmers thanks to this project. Based on its recommendations, Lesotho's government has responded by identifying sites for produce centres in each of Lesotho's 10 districts. It has also indicated that all produce will be graded, packaged, weighed, and classified. South African produce will not be sold in Lesotho unless there is a shortage locally.

Of the project's role, principal researcher Ms Mocheblele says, "We are basically a service arm of the government. All of our recommendations filter down from the government to the farmers."

Their research, however, is not without major obstacles.

The government may interpret marketing problems differently and dispute some of the team's findings. The researchers must turn criticisms into policy recommendations.



Packaging fodder on the farm in Lesotho.

Another significant drawback is the researchers' inability to work with ministries other than agriculture — such as trade and industry — which influence marketing systems.

To date, one of the project's major successes has been in dairy marketing. Acting on project recommendations supported by Lesotho's government, the Canadian International Development Agency (CIDA) implemented reforms to the Canada/Lesotho Dairy Development Project in 1985. These changes resulted in the creation of a dairy collection and marketing infrastructure, the upgrading of dairy breeds, and the cultivation of alfalfa for fodder.

Milk collection plants and cooling centres have been built in central areas of the Lowland districts of Butha-Buthe, Leribe, and Mohale's Hoek where farmers bring their milk daily. More centres are being planned in other areas. The milk is then shipped to a central collection plant in the capital of Maseru, where it is processed and sold to retailers.

Dairy farmer Mr Samuel Motlomelo praises the CIDA project for providing an efficient collection infrastructure but admits he had no idea the IDRC-funded research project played such a key role in creating this dairy marketing system. In fact, he is unaware that any dairy marketing board exists at all.

A successful dairy farmer by Lesotho standards, Mr Motlomelo owns six dairy cows that, collectively, produce 90 litres of milk per day. Although he and other dairy farmers have benefited from the joint dairy project, there are still areas where he would like to see government improvement.

"Farmers don't have any control over what price milk is sold to retailers," Mr Motlomelo says. "I sell my milk to the dairy plant at 70 lisente (US 35 cents). The dairy plant then sells my milk at M1 .20 (US 60 cents) to grocery stores like OK and Frasers, which charge the customer as much as they want. I feel like Mr Fraser owns me. There should be price controls at all levels, from the farmer to the consumer."

He would also like to see the creation of credit and loan schemes that would "serve the interests of the rural poor and ordinary farmers." He suggests that the government should closely monitor hygienic standards where milk is produced and force farmers to milk in shelters instead of in the open.

Most importantly, Mr Motlomelo feels the current land tenure system should be reformed to allow farmers to rent land and expand. "We can't all be small-scale dairy farmers. We can't all live hand to mouth."



Black Jesus shows off his garden with obvious pride.

To reduce overstocking and overgrazing, the marketing project has recommended that the Ministry of Agriculture introduce grazing fees, levies imposed on livestock per head, to encourage farmers to dispose of nonproductive livestock that put pressure on Lesotho's limited land and resources. This would address concerns raised by farmers like Motlomelo who want to expand their dairy operations.

Although the Ministry of Agriculture is introducing these, it has already implemented project recommendations dealing with livestock. Frequent livestock auctions are held in each district, publicized through the distribution of auction sales calendars and radio announcements. Auctions are open to private traders and individuals.

All cattle, sheep, and goats are graded and all sold cattle must have ownership and identification certificates, known as Babeise, to prevent the sale of stolen animals. The Ministry of Agriculture also offers education and training for farmers, including courses for herdboys.

The research work of this marketing project is slated to continue in a projected third phase. According to Dr Malahleha, developing new marketing policies will become more complicated "in light of the many political changes taking place in the region."

The disintegration of apartheid, Lesotho's anticipated return to democracy in 1992, and the return of large numbers of Basotho from South African mines over the next 15 years, make improved agricultural marketing not only a priority but a necessity.

Deborah Carter in Lesotho



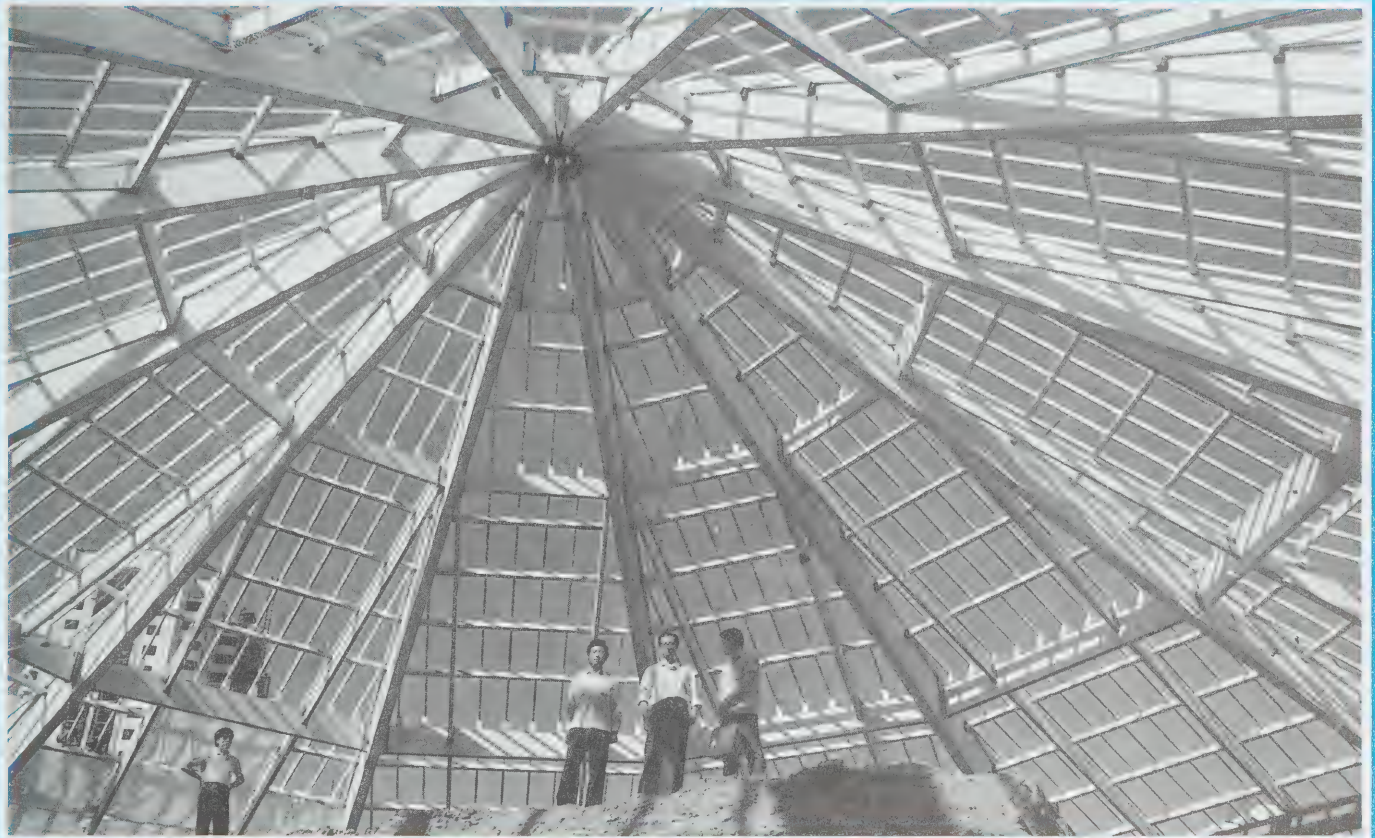
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FINGERING A SOLUTION TO CHINA'S DWINDLING FORESTS

A new wood-processing technique making use of small, crooked and thinned-out lumber may help to save China's forests and meet its growing demand for timber. The technique, called finger-jointing, was introduced to China under an IDRC-sponsored project called "Wood Utilization." When widely adopted in this country, the innovation could save millions of cubic metres of timber annually.

The finger-jointing technique involves profiling wood ends into finger shapes and then joining pieces of small-sized lumber with adhesives to produce straight and long wood commodities. The first step in the process involves air-drying pieces of wood until there is a low moisture content. Then, a glue-like substance is applied to the ends, the "finger-profiles," and they are pressed together at great pressure. The interlocked pieces of wood are held firmly by the adhesive and can be used for various construction and building purposes.

The most obvious examples of this technique being put into practice are the huge beams installed in the water park of the Beijing Recreation Centre for the XI Asian Games. In this unique building, finger-jointed pieces of lumber were used as massive support beams: beams that are currently the largest wooden structures in China.



The roof framework of the water park at Beijing Recreation Center: 12 laminated beams made from finger-jointed wood.

Finger-jointing has been used for years with mature, dry lumber but this project is experimenting with green, juvenile lumber and logging and mill residues that are usually seen as waste. China's dwindling forestry resources could use the help.

With about 120 million hectares of forests and 9 billion cubic metres of standing lumber, China is one of the world's largest timber producers and users. The massive construction currently underway in the country has brought annual timber consumption to an unprecedented volume exceeding 60 million cubic metres a year.

To meet this spiralling demand for wood, 344 million cubic metres of logs are felled annually. At this rate, China's lumber resources will be seriously depleted or even exhausted in the foreseeable future.

The IDRC-sponsored project is one of the measures taken to tackle the problem of resource depletion. Using the technique devised and patented in the early 1970s by Dr Suezone Chow, a Canadian scientist with Canadian Forest Products Ltd, small, crooked logs can be transformed into large solid wood structures suitable for a great variety of purposes.

According to present estimates, there are about 71 million hectares of young forests in China. Even if only half of them are thinned every 10 years, about 7 million cubic metres of lumber will become available annually. The thinnings from the recently planted forests in denuded lands will add another 8 million cubic metres a year. If the juvenile timber is finger-jointed it may contribute some additional 2-2.5 million cubic meters of timber. The

finger-jointing technique can, therefore, add to the potential resources available in China and hopefully alleviate the shortage of wood supply.

With a grant from IDRC and an appropriation from the Chinese government, the Research Institute of Wood Industry (RIWI), under the supervision of the Chinese Academy of Forestry, took on the task of developing a new type of glue, learning the finger-jointing technique and testing these methods. In June 1987, two Chinese experts, Zhu Huanming and Luo Wenshi spent 3 weeks in Canada at Canadian Forest Products Ltd to study the technique.

Following their study tour, Zhu Huanming and Luo Wenshi organized an eight-member research group to conduct research in glue, finger-jointing techniques, and wood preservation. Under the guidance of a Canadian expert, Mr Luo, a glue expert, formulated an adhesive named



This huge beam measures 2 metres by 40 centimetres and is 30 m long. It was made by recycling 15,510 wood boards.

phenol resorcinol formaldehyde (PRF), using Chinese raw materials. Laboratory tests indicate that the quality of the adhesive is as good as the imported varieties in China.

Smit Boonthanomwong, managing director of A.M. Latex Co. Ltd of Thailand, inquired about the possibilities of selling the glue to Thailand and setting up a joint venture for producing the adhesives in that country.

It was this adhesive that was successfully applied to produce the 12 large wooden beams for the roof framework of the water park in the Beijing Recreation Center. The beams are 30 metres in length, 2 metres high, and 40 centimetres thick. Each one was finger-jointed and laminated with about 15,500 wood boards.

The finger-jointing technique has also been used in the automotive industry. Guihua Forestry Farm in Hubei province, one of China's 3,900 state-owned forest farms, has established a timber-processing factory equipped with shapers and presses imported from the Dimter Company of Germany. Using Masson pines as the raw material, it has been producing

shock-absorbent timber pads and bottom plates for trucks (i.e., supporting frames for truck beds) at the No. 2 Motor Vehicle Plant in Hubei, the largest in China. The processing factory has a production capacity of some 3,000 cubic metres a year and has created jobs for 100 people.

Meanwhile, Zhu Huanming has made arrangements with three plants in Jiangxi, Guangdong, and Jiangsu for the introduction of the finger-jointing technique. The plants in Jingan County of Jiangxi and Xuwen County of Guangdong, both of which plan to finger-joint hard wood, have an annual production capacity of some 2,000 cubic metres. The Jiangsu project, undertaken by the Xushou Coal Mining Bureau, will produce finger-jointed wood for making window and door frames in housing.

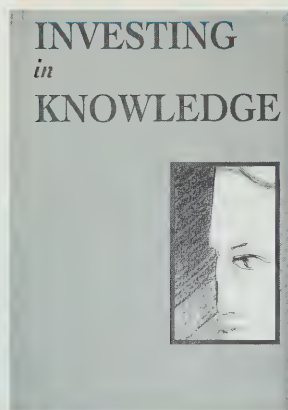
Zhu Huanming says that in the future greater efforts will be devoted to training wood-processing workers. He will organize a training course for 20–30 people from different parts of the country every year to popularize the technique.

Despite the success of finger-jointing, the Chinese researchers stress that it is just one part of a campaign to conserve and sustain the country's forests. Efforts to stimulate the creation of new fast-growing forests and to reforest depleted lands are also being launched annually in the drive to preserve these resources. In the wake of a growing population that will demand more and more wood products, these measures have become more than just immediate, short-term solutions — they are vital to the very survival of China's forests.

Zhao Qinghua in China



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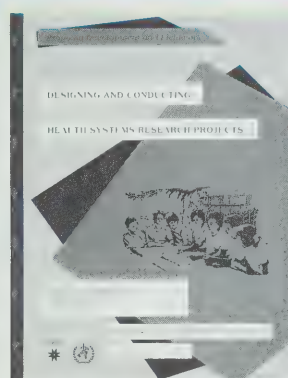


«Investing in Knowledge: Strengthening the Foundation for Research in Latin America»

by J.J. Brunner
IDRC-281e

This book is the first in a series of studies supported by IDRC on the role of the university in human resource development. The author provides insight into the potential of Latin America to expand the "knowledge industry," to influence its evolution and to link it with development. The author also illustrates the importance of a holistic perspective when building and maintaining research capacity in the developing world.

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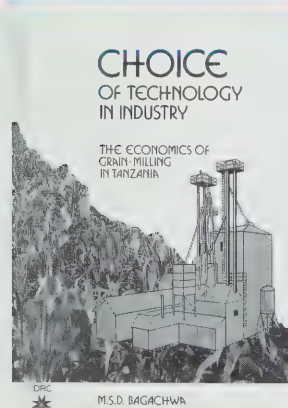


«Health Systems Research Training Series»

by Ann Brownlee, Corlien Varkevisser, Indra Pathmanathan, Lilia Duran Gonzales, and N.I. Nik-Safiah
IDRC-286e, 287e.1, 287e.2, 288e, 289e, and 290e

In collaboration with WHO, IDRC has published this research series as a five-volume set of training guides. Health Systems Research aims to improve the health of individuals and communities by increasing the efficiency and effectiveness of health programs and reducing the costs of health care. The series is intended for health specialists attending training programs or workshops, tertiary level instructors and students in health related courses, decision-makers, research managers, and community leaders.

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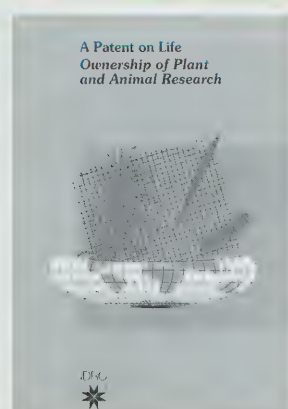


«Choice of Technology in Industry: The Economics of Grain Milling in Tanzania»

by M.S.D. Bagachwa
IDRC-279e

This book evaluates the relative performance of alternative grain-milling techniques in Tanzania, seeking to identify appropriate techniques and explain why some firms have selected inappropriate methods and products. Consequences of technology choice are discussed in the context of employment creation, output expansion, surplus generation, skill formation, and overall resource use.

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«A Patent on Life: Ownership of Plant and Animal Research»

by Brian Belcher and Geoffrey Hawtin
IDRC-269e

This book explores the technical and ethical issues involved in patents on life forms and the important implications for agricultural and biological research around the world. It is designed to stimulate public dialogue in an area of research that is becoming increasingly privatized and dictated by commercial interests.

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F O C U S

In apartheid's retreat comes the potential of development for all South Africans. State policies are favouring reform over repression and with so many of its political and social institutions in flux, the country has become a unique laboratory of change on the African continent.

The international media show us conflicting images of South Africa in transition. Photos of smiling heads of government chatting with Nelson Mandela are juxtaposed with news of violent and deadly clashes in the townships. The media, however, seldom report on the many researchers who are preparing for the country's post-apartheid future. There is much work for them to do — laws must be revised, the economy overhauled, and cities restructured.

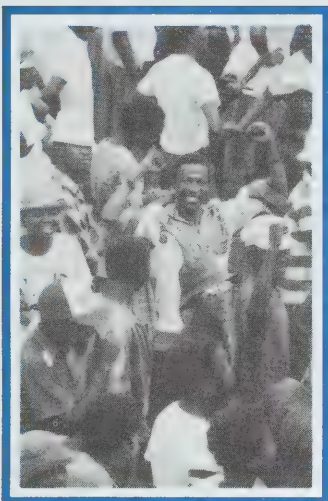
Although apartheid was unique to South Africa, the country's problems are not. It is not only in South Africa where migrant labourers work in low-status jobs, where shantytowns overlook palatial homes, where AIDS ravages the population. Countries of both North and South can draw lessons from the findings of South Africa's leading researchers. Some of their work is highlighted in the following pages.

Conditions of great hardship and heightened tensions can often inspire creative thinking and bold ideas. The researchers who are developing innovative solutions to South Africa's problems experience this phenomenon daily.

Editor-in-Chief

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SOUTH AFRICA IN TRANSITION

There is new hope in South Africa. The political situation in the republic remains fragile and external pressure for change must continue, but there is now some prospect for movement toward democratic government in the coming years.

Decades of apartheid have left unacceptable levels of poverty and extreme economic and social discrimination against a majority of South Africans.

The building of a new post-apartheid, democratic South Africa is a project in which the entire world takes an interest. It is a crucial experiment, not only to stability within the country itself, but also to prospects for economic development in the

entire southern African region. To reach this goal, economic policies must be directed toward removing the enormous inequalities that have emerged from apartheid.

Apartheid has been a major obstacle to long-term economic growth in South Africa. In preserving the welfare and security of whites, successive governments have restricted black access to land, education, training, and credit. They have established economically unviable black homelands, created large and costly bureaucracies, and invested large sums of money in non-economic projects, such as combating external pressure for reform.

The detrimental effects of apartheid on the economy are most evident from the extreme poverty and inequality that today characterizes South African society. According to the Gini co-efficient, an economic measurement of income distribution, South Africa has the most unequal income distribution of any country in the world. It will therefore be an urgent economic priority for any incoming government to implement policies aimed at restructuring the apartheid economy along with the repressive political system.

Within the membership of the African National Congress (ANC) and other political groups, the trade union movement, the universities, and many within government and business, there is now broad agreement on the need for undertaking careful economic analysis and implementing studied policies to achieve equity for the black population as quickly as possible. This can be done, it is hoped, while preserving economic stability and, if possible, increasing overall growth. There is also agreement that policies seeking to increase overall economic growth, in the hope that this will "raise all boats", are not sufficient.

It is extremely difficult for a "government-in-waiting" to prepare for power in circumstances where most of its supporters still possess no formal political rights and continue to live in a climate of violence and mistrust. There remains an enormous imbalance in the access to information

Building a Post-Apartheid Future: IDRC and South Africa

The victory of the "yes" vote in March's all-white referendum has placed South Africa on the uncertain path toward democracy. After decades of apartheid and repression, South Africans appear ready for reconciliation and real negotiations aimed at building a post-apartheid society. While maintaining this optimism for the future, difficult questions must be addressed. How will these negotiations take place given the enormous imbalance in human and technical resources between the democratic movement and the South African government? Where will the democratic movement obtain the necessary research and information to formulate alternative policies for negotiations? How will the democratic movement prepare itself to play an important role in governing South Africa? These questions are critical in view of the negotiations now taking place on a playing field that is profoundly uneven.

IDRC's South Africa program is engaged in supporting the efforts of the democratic movement to prepare for and engage in negotiations. Since 1988, IDRC has been funding research in South Africa in accordance with the Centre's South Africa policy. This policy directs support to those disadvantaged by apartheid and their efforts to restructure South African society. In this context, the IDRC South Africa program has concentrated on three critical areas: economic restructuring, urban governance, and health. The articles in this issue of *IDRC Reports* elaborate on some of the research initiatives in these sectors.

The importance of research and policy analysis for the future development of South Africa has prompted IDRC to expand its South Africa program to include areas such as education, land use/land reforms, restructuring of the research system, and regional integration. To guide the program's implementation, the IDRC Board of Governors recommended that a new IDRC office be established in South Africa. The office is now located in Johannesburg.

During this critical period in South Africa's history, it is of paramount importance that the international community play a positive role in facilitating the transition process. The Centre believes that IDRC is playing such a role. It will continue to do so until the transition process is over, at which time it plans to reassess its involvement in South Africa.

Marc Van Ameringen, Program Manager, IDRC, South Africa Office.



Arms raised in unison. Does this symbolize South Africa's post-apartheid future?

and capacities between those in the present South African government (and white businesses) and those of the prospective democratic government. The weak economic performance of the South African economy in recent years — low investment, low growth, rising unemployment, and high rates of price inflation — has not helped either.

DEVELOP POLICIES

Despite these difficulties and uncertainties, it is now critically important that economic policies be soundly and carefully formulated within the democratic government, particularly by the ANC, and that they be credible within both the business community and the wider community, in South Africa and abroad. Solid economic policy is a *sine qua non* of effective government. Next to constitutional negotiations, the primary attention in the transition to democratic government must be given to economic analysis, policy-formulation, and capacity-building to this end. There is much to be done.

Many of the necessary skills and experience for this effort can readily be found in today's South Africa, but very few are currently available to prospective policymakers in a

democratic government. Highest priority should be assigned to the construction of institutional mechanisms (supportive networks, task forces, committees) to permit the ANC (and others) to use the available talent so they can prepare for effective policy-making.

Some policy areas require immediate attention: the assignment of responsibility for economic policy to a "shadow" cabinet in the ANC and other opposition political groupings; the strengthening of the monitoring and analytical capacity of the ANC and other non-establishment groups preparing for a democratic future; the creation of a flexible system for undertaking timely and policy-relevant macroeconomic research for "governments-in-waiting"; and the preparation of an agreed upon and credible macroeconomic framework for the use of the ANC and other policymakers.

There is also an urgent need for detailed studies in potential tax reforms and the feasible restructuring of central and local government expenditures. Innovative means of meeting pressing needs for housing, public health, and education must be introduced along with improvements in the functioning of the financial

system and appropriate employment and income policies. Only of slightly less immediate priority are independent analyses of trade and industrialization policies, balance of payments management, agricultural and rural development schemes, the appropriate role of the state, and future relations with other countries in southern Africa.

There must be mechanisms for mobilizing independent local research and analytical capacity in these areas for those who are likely to form a government in a future democratic South Africa. Such efforts will require external support, not so much to undertake this analysis with foreign expertise (the World Bank will, in any case, be "parachuting in" lots of economic policy advice), but to free local personnel and institutions to do it themselves. The capacity of opposition groups must rapidly be built in order to undertake indigenous analysis and to assess the value of external advice.

To meet immediate and long-term demands, there is an obvious need for greatly strengthened training and capacity building for those in the black community — both formal training and development of experience in actual work situations. The record of South African business and government in this area has been grossly deficient. Much more can also be done in this sphere by friends of the democratic movement outside South Africa.

The formulation of workable and credible economic policies can ease the transition in South Africa from an inefficient, repressive society to a post-apartheid, democratic country. The international community can, and should, work quickly toward the support of indigenous efforts in this crucial sphere of change in South Africa.

Dr Gerald Helleiner, University of Toronto. Dr Helleiner was the leader of the IDRC-sponsored economic mission to South Africa in 1991.



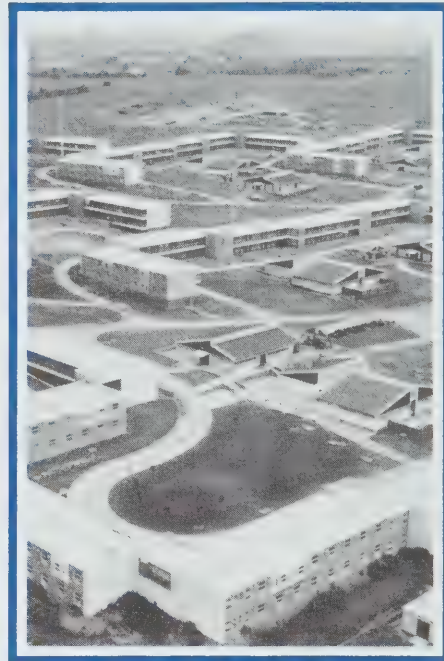
"Economic Analysis and Policy Formulation for Post-Apartheid South Africa", Mission Report, August 1991. Available from IDRC, Ottawa, Canada.



FROM HOSTELS TO HOMES: HOUSING OPTIONS FOR MINERS



A mine compound of the 1950s. All hostels can be seen from a central point.



A mining complex built in the 1970s.

When Richard Mamola grew up in rural Transkei on South Africa's eastern seaboard in the 1950s, he hardly knew his father, who was a migrant worker on the gold mines.

"He would come home to visit maybe four times a year to plough the land," says Mamola, who followed in his father's footsteps to become an underground worker at the Stilfontein goldmine in the Western Transvaal in 1964.

"At that time I was staying in a room of 20 people," he says. "The beds were made of concrete, built into the wall. I was only earning four pounds a month and had no blankets. I bought blankets one by one until I was able to make a mattress with them."

Today Mamola is an assistant electrician. Although only 53, he has the gnarled and worn features that miners develop from three decades of heavy labour in the hot depths of South Africa's gold mines, the deepest in the world. But he has done something that his father, who retired to his cattle and tribal homestead after

a lifetime of digging gold, was never able to do. Mamola has bought a house in Thabong, the black township outside the mining town of Welkom, where he lives with his family.

FORCED SEPARATION

Until 1985, the South African government's apartheid policy of influx control made it virtually impossible for black contract workers from the rural areas to move legally with their families to the cities. They were forced to live in migrant worker hostels, sometimes a dozen or more men to a room, and to leave their wives and children in the country's impoverished rural areas.

Nowhere was the migrant labour system more deeply entrenched than on the mines. An estimated 97% to 98% of the mining workforce of 700,000 were migrant workers, forced to share crowded hostels on the premises of their employers.

Indeed, the development of the mining industry — the pillar of the apartheid economy — depended on the cheap, unskilled labour supplied by migrant workers.

"It's arguable that gold mining would never have come into existence without migrant labour," says Dr Jonathan Crush, of the Department of Geography at Queen's University in Kingston, Ontario and a joint leader of a co-operative project between Queen's and the University of Cape Town. The IDRC-funded project is exploring alternatives to the migrant labour system.

PREDATES APARTHEID

The mining industry's exploitation of migrant labour pre-dates apartheid by more than 80 years. "The mines' migrant labour system is not simply a product of apartheid policies," says Dr Wilmot James, of the Department of Sociology at the University of Cape Town and the other project leader.

"Certainly, apartheid practices — here I have in mind homeland policies, influx control, and single-sex hostels — have upheld and reproduced the migrant labour system and used its example as a model for other sectors of the economy. The abolition of apartheid is hardly a sufficient condition to the abolition of migrant labour," says Dr James.

The immediate aim of the project is to examine how to dismantle the migrant labour system on South Africa's mines and to develop housing alternatives for black miners and their families. Dr James says there is a need to move beyond rhetoric and to place migrancy and the restructuring of labour markets on South Africa's political agenda.

There is a perception that the issue is already being addressed. With the easing of influx control, the emergence of a powerful black union on the mines, the National Union of Mineworkers, and the liberalization of employment practices, some of the mining conglomerates began to implement housing schemes for migrant workers.

One of the beneficiaries was Richard Mamola, who had moved out of the hostels almost 20 years ago to live with his wife, Selina. They lived in a tin shanty in Thabong township near the mine where he worked. When the mine announced that it was building new houses in Thabong and that senior staff could apply, Mamola was one of the first in line.

His housing problems, however, did not end with the purchase of his home. Out of his paycheque of R450 (CAD \$200) a month, Mamola has to pay R170 a month for his house. After other deductions, he's only left with R200 a month. He has bought his house on a 20-year bond scheme. But in three years, he will retire and he does not know how he will be able to pay the monthly instalments. Eviction could follow.

LUCKY FEW

Even so, Richard Mamola is one of the privileged few. Dr James says the impact of the home ownership schemes introduced by mining houses such as Anglo American, Johannesburg Consolidated Investments, and Rand Mines has been limited. These companies still have a work force that is 96% migrant.

Dr James says that for the most part, only the better paid and more senior black workers got family housing. Moreover, it was the policy of mining companies and the state to forbid foreign workers from settling

permanently on or near the mines. Most of the black mining workforce come from the homelands or neighbouring countries, such as Lesotho and Mozambique.

One of the housing scheme's key limitations has been the top-down, paternalistic planning approach of mine management. This has resulted, says researcher and town planner Katherine Laburn-Pearl, in inadequate education on housing matters and a failure to meet the housing needs of a large proportion of mineworkers. "Workers have not been consulted about, let alone invited to participate in the planning process for changes to mining house delivery. What they have been subjected to is a barrage of promotional material from mine management, yet gaps in their understanding remain. This points not only to inadequate education on the subject, but also to the inappropriate planning process that is being followed."

Laburn-Pearl, a member of the migrant worker project, conducted a survey in 1988 on behalf of one of the mining houses on the attitudes of black workers to the housing schemes. She concluded that planners had overestimated the ability of black workers, raised under paternalistic mine compound conditions, to adjust to normal township living. She also found that planners had failed to take into account the different housing needs and priorities of a broad variety of workers.

Using the same survey in 1991, this time for the migrant labour project, Laburn-Pearl and field researcher Hosia Mohlabane found that the general understanding of the housing scheme was only marginally better than three years previously.

LITTLE CHANGE

Four years after the introduction of the Home Ownership project, the scheme continues to attract young, skilled workers who are used to urban living. "Those who have participated have by and large previously lived in townships and have not brought their families from rural or homeland situations," Laburn-Pearl says. Thus the roots of the migrant labour system are still intact.

Dr James says that many migrant workers did not wish to move permanently to the mines. Some did not want their families close to the violent rebellion in the townships. Others feared that urban living would cost too much. Many miners also retained emotional and material ties to their homes in rural areas.

There were many others, however, like Richard Mamola who rented rooms and shacks in the townships near the mines. Living in cramped, overcrowded conditions, they avoided the separation of families that is a feature of hostel life.

"For these, the scheme has provided a welcome means to obtain their own property, although many might be ambivalent about the financial advantages of this, especially in the current recession," says Laburn-Pearl.

CLEAN WAGE

The economic crisis of the gold mines compelled the mining houses to suspend their home ownership schemes last year. Dr James says that instead, they sought to get out of the home ownership business by introducing the concept of a "clean" or "all-inclusive" wage.

"The idea was to pay black workers a wage that included an accommodation component, which could then be used to rent single-sex accommodations or township units or to pay for mortgages or the erection of squatter shacks."

Left to their own devices, there are no powerful driving forces pushing either the mine companies or migrant workers toward a restructuring of migrant labour markets. "The present state has shown no interest in abandoning migrancy for the mines and, as a result, allocated no additional resources that could assist in the development of settled communities of labour," says Dr James.

He suggests that the government could offer tax incentives and subsidies to encourage mining companies to reform the hostel system. He also says that low-income public housing should be available for those workers who want to settle permanently near the mines and better, more humane hostels could be built for those who prefer to remain as



GROWTH THROUGH REDISTRIBUTION

migrant labourers. Dr James does point out, however, that migrant workers at least have housing in a country where there are an estimated seven million homeless people.

Richard Mamola is thus, for all the humbleness of his spare, two-bedroom home, a member of a tiny minority of black South Africans. He has a son, William, who has started a business in the township manufacturing security gates. William is trying to earn enough money to study to become an architect.

For Mamola and others like him, there is no turning back. They are urbanites now. "I am going to stay here. I have even cancelled my Transkei citizenship and given my cattle to my younger brothers," he says.

But for the vast majority of the hundreds of thousands of black men on South Africa's gold mines, the migrant labour system continues to operate — and, if nothing is done to address the problem now, could long outlive apartheid.

Phillip van Niekerk in South Africa

NOTE: Working papers with detailed project findings are available from Dr Crush or Dr James.



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South Africa is in economic crisis. Unemployment is high, productivity is low, and per capita income is declining. The economic strategies of the apartheid government have proved unworkable and unresponsive to the needs of most South Africans.

The country clearly needs new prescriptions for economic growth that take into account the demands of an evolving post-apartheid state.

Just as apartheid has politically disenfranchised the majority of South Africans, it has also left millions of people economically marginalized. The transition of South Africa to a democratic, multi-racial state cannot therefore be accomplished by political reform alone — it must be accompanied by a fundamental restructuring of the economy.

One research project funded by IDRC is preparing for this reconstruction. A group of economists belonging to the Economic Trends Research Group is seeking to develop an industrial strategy for the South African manufacturing sector in a post-apartheid economy.

The Economics Trends Research Group is a network of economists affiliated with the Congress of South African Trade Unions (COSATU). The network, which is coordinated from the University of Cape Town, was established six years ago with the mandate to research and analyze alternative economic policies. The group's industrial strategy project is an important initiative in policy formulation for a new South Africa.

SHRINKING ECONOMY

Economists with the project must grapple with problems that have caused the South African economy to shrink over the last twenty years. The past decade has seen real per capita incomes, a key measurement of economic growth, fall between 10 and 15%. The country, having failed to adapt to the changing global market of the late 1970s and early 80s, is no longer export competitive. Between 1955 and 1985, South Africa's share of global manufacturing exports fell from 2.62 to 0.84%.

As the manufacturing sector declined, the economy came to depend on the export of primary commodities, which are subject to substantial price fluctuations. This is more typical of a developing country than an industrialized one and, indeed, South Africa has been outstripped by the performance of other middle-income nations.

Job creation is also a problem. Unemployment figures range between 3.3 and 5.3 million people in a total population of 40 million. The vast majority of these are black South Africans.

Blacks are further disadvantaged by an economy that is highly skewed in favour of the white minority. Industry and high-income housing receive electricity while squatter camps lie in darkness. Factories produce luxury goods and cars rather than items that can be bought by low wage earners. Well-maintained super highways link major cities while roads in the black townships are pitted with potholes.

The economy is also characterized by high levels of concentration and centralization. Six conglomerates control the mining, manufacturing, and financial sectors. There are few micro-enterprises and the informal sector is undeveloped compared with other African countries.

GROWTH STRATEGY

The Economic Trends Research Group believes that these economic ills can be treated with a strategy they term "growth through redistribution."

"Our position is that growth can only take place on the basis of redistribution of productive capacity and productive resources to the mass of the population," says Dr Michael Morris, an economist with the project who is based at the University of Natal in Durban.



Strategies for a post-apartheid economy must include the revitalization of the South African manufacturing sector, which is no longer export competitive.

He says this strategy differs from that advocated by radical free market economists, which he describes as "let the rich get richer and the poor will just catch up 10 years later."

In a post-apartheid economy, Morris envisages a revitalized manufacturing sector that is characterized by new methods of factory organization, integrated technology, more inter-firm

cooperation, and improved skills training. He says that state intervention is critical in making these changes: "If you leave things to the market, then nothing will happen."

The industrial strategy project will develop policy recommendations designed to guide state intervention in a post-apartheid economy. The economists hope that these policies will help South Africa catch up with

middle-income countries like South Korea, where the state has been used effectively to foster economic development. Project recommendations will be drawn from a series of sectoral and cross-sectoral studies of the South African economy.

PROJECT GOALS

These studies have three objectives. The first is to fill an information gap — there are currently no detailed studies of the South African industrial sector. The information generated from this study will be crucial to formulating an industrial strategy.

The project will also examine how the current structure of South African industry can be adapted to a new strategy for growth. A third objective is to train policy-makers, with particular emphasis on black economists.

Throughout the project, researchers will interact regularly with the COSATU and the African National Congress so that work will proceed in tandem with the changing political environment. Project economists will also develop links between the state and the private sector.

"In order to have an impact, one has to feed these ideas into the general debate," Dr Morris says. "That means major contact with the state and the private sector." He and his colleagues also plan to circulate results through the media.

The industrial strategy project represents a pragmatic approach to influencing debate on the structure of a post-apartheid economy. "Political slogans are not the order of the day right now," says Dr Morris. "Without policy formulation and alternative policy research, we'll get absolutely nowhere. We need to win the political game in South Africa over which kinds of policies are going to dominate in the future."

Jennifer Pepall in Ottawa



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STEMMING THE TIDE OF AIDS

What do young black South Africans think about AIDS?

Dr Barry Kistnasamy, a member of the IDRC-funded Centre for Health and Social Studies (CHESS) in the University of Natal's medical faculty, said that, surrounded as they are by violence, young black youth often have a fatalistic attitude toward preventive measures against the disease. What he and his colleagues heard from them in AIDS seminars was: "Why should I use a condom tonight if I'm going to die tomorrow at the hands of the hit squad?"

Dr Kistnasamy also said a number of critical factors besides violence lead to transmission of the human immunodeficiency virus (HIV) in South Africa.

One is the migrant labour system. There are approximately three million black men living in single-sex hostels — with a micro-economy of sex-trade workers surrounding them. The risk of AIDS spreading there is high because many workers have multiple sexual partners and do not frequently practice safe sex.

Another is the vulnerable status of black women, who cannot insist on condom usage because they suffer a triple oppression of culture, race, and class. If they tell a prospective sexual partner, "If you do not wear a condom, I will not sleep with you," they are likely to receive the reply, "Well, I'll go to another woman."

Dr Noddy Jinabhai, the director of CHESS, gave yet another reason for South Africans' negative attitudes toward condoms: "They're not popular because condoms have been promoted by the government as a form of birth control to curtail the black population."

For the Medical Research Council of South Africa, CHESS has been conducting a survey of black adolescent high school students' attitudes to sexuality and condom use in urban black South African



An AIDS awareness billboard in central Johannesburg. An estimated 450,000 South Africans were infected with HIV by the end of 1991.

townships. The project looks at condom availability and use as the major factors in AIDS prevention. "It's been a fascinating study," said Dr Jinabhai. For example:

"We thought that we should do the survey among the 14 to 17-year-olds because they have a better grasp of English and they are less likely to be sexually active. We were astounded that the majority of that group were long ago sexually active. We found that we needed to start at ages 11, 12, and 13 to find those who are not sexually active. This included both boys and girls."

Dr Kistnasamy, who is a physician and specialist in community medicine, predicted that when added to the socio-economic problems of poor South African communities, "AIDS is going to have a devastating impact."

But Dr Jinabhai found one reassuring aspect: "We are very fortunate that we have not reached epidemic proportions of AIDS in South Africa. It's been spreading down from Central Africa, down truck routes from Zambia and Zimbabwe and Mozambique, and it's obviously in South Africa. But from the few surveys that have been done we can say that it hasn't reached epidemic proportions yet. The number of people infected

doubles in about nine months. If in the next six months to a year or two we can go in for a massive intervention program, we could actually blunt the epidemic."

AIDS PROJECTS

This urgency helps explain IDRC's interest in AIDS prevention in South Africa, which it is furthering through its support of CHESS (see sidebar).

One IDRC-funded project originally involved South African refugees in camps in Zambia, Uganda, and Tanzania, but has been re-located to Natal because many of the exiles have returned to South Africa. The collaborating institutions in the project are the Health and Refugee Trust (HEART), a British charity, and the health department of the African National Congress.

The goal is to develop an information base about the attitudes of South African refugees to AIDS and other sexually-transmitted diseases. Project researchers hope to introduce educational materials for prevention programs in three areas: hostels, squatter settlements, and rural communities. Another project, aimed at preventing HIV spread within organized labour in South Africa,

concentrates on long-distance truck drivers. They are members of the Transport and General Workers Union, who, with the Workplace Information Group, are administering the project.

These truckers are considered to be at special risk of HIV infection. Away from home at least six days out of seven, they frequently have multiple sexual partners and travel in countries where HIV prevalence is higher than in South Africa. In one small sample tested in 1989, for example, 13 of 26 such drivers were found to be HIV positive.

The first two cases of AIDS in South Africa were confirmed in 1982. As of July 1991, there had been 818 cases and 374 deaths. The best available data indicated that 445,000 people were infected with HIV at the end of 1991.

The main spread of the virus in the black community occurs heterosexually, the other major route being from mother to child. Intravenous drug use and contaminated blood products are rarely found to spread the virus. In the white population, the principal spread is within the homosexual community. Some 50% of the African population is under the age of 21 — another factor that promotes the spread of AIDS.

Attitudes of South African whites very according to their place in society, Dr Jinabhai said.

"Among the more educated, affluent section of the white community, there's a very high level of awareness and a very high level of concern, and I would suspect a certain measure of practice of safe sex. Among a large section of the white working class, I would suspect again their knowledge and awareness would be fairly high. But the practice of safe sex would be probably low, as would be the case with, say, urbanized African males."

COMMON PROBLEMS

Dr Jinabhai is himself a native of South Africa, and is a physician, community health specialist, and epidemiologist. He noted that despite great differences between his country and others, some aspects of the AIDS situation are similar globally. For example, a number of studies have shown that AIDS awareness is not a problem among black people in many parts of the world, including South Africa. Many people have heard about the disease and are aware that it is deadly, but still do not practice safe sex.

"A major problem in South Africa — as with most parts of the world — is that the practice of safe sex is extremely low," he said. "We feel it's absolutely imperative that we change attitudes. We are going to have to find innovative ways of doing research (to accomplish this)."

CHESS :

Examining Health Issues

Millions of South Africans may one day be served by a health service resulting from research undertaken by an organization known as CHESS, which is supported by IDRC.

The Centre for Health and Social Studies (CHESS), established in 1988 by an anti-apartheid group of doctors and dentists (the National Medical and Dental Association), was set up to make possible health research, policy formulation, education, and training for South Africans.

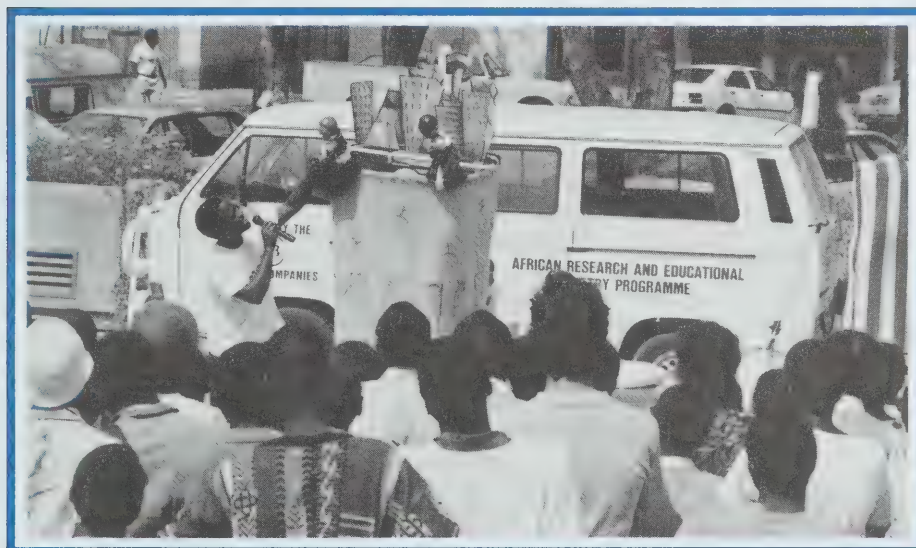
In July 1991, CHESS received an IDRC grant for institutional support, which constitutes its principal funding. CHESS is based in the pediatric department of the University of Natal. Its board of management includes representatives from both universities in Durban, the British charity HEART (Health and Refugee Trust), and the Mass Democratic Movement.

Dr Noddy Jinabhai, the director, said that CHESS has recently completed a major study of a squatter settlement outside Durban to determine the impact of urbanization on health. The objective is to develop housing and health services based on community participation models.

"We are hoping this particular study will provide a framework for a district health service or a regional health delivery system to emerge, based on the research just completed," he said. Some nine million people live in the region.

Within its major programs, CHESS has projects dealing with a wide variety of subjects, including a food and nutrition delivery scheme, a computer-based health resources information system for policy planning, monitoring and evaluation, an analysis of children's diseases, and an educational and training program.

During the past year and a half, CHESS has attempted to create a critical mass of researchers and policy analysts in the Natal region. "We have deliberately chosen a fairly narrow regional focus, but we hope that this will have some implications at the national level," said Dr Jinabhai.



A performance of the group Puppets Against AIDS helps to overcome the lack of AIDS education in South Africa.



CIVIC PRIDE

The most important disease in South Africa is tuberculosis, with 85,000 new cases per annum. By comparison, the total number of new AIDS cases was only 175 in 1989, 302 in 1990, and 165 in 1991.

"But given the nature of HIV infection and the mortality and the potential to devastate the working class, it's a very serious problem we have to tackle," said Dr Jinabhai.

Drs Jinabhai and Kistnasamy pointed to the weakness of the public health system in South Africa as a limiting factor in efforts to slow the spread of AIDS. The United States and South Africa are the only two countries in the Western world that do not have a national health system, said Dr Kistnasamy.

Eighty per cent of whites have pre-paid health insurance and are served by a highly-entrenched private sector that provides services such as heart transplants and hi-tech equipment. Yet only 7% of blacks have pre-paid health insurance, and most must use over-crowded, under-funded black hospitals. There are 195 multinational drug companies and a medical equipment industry in the country, but there is little in the way of community health services for the majority of the population. The health system, with its 14 ministries, is currently being re-structured.

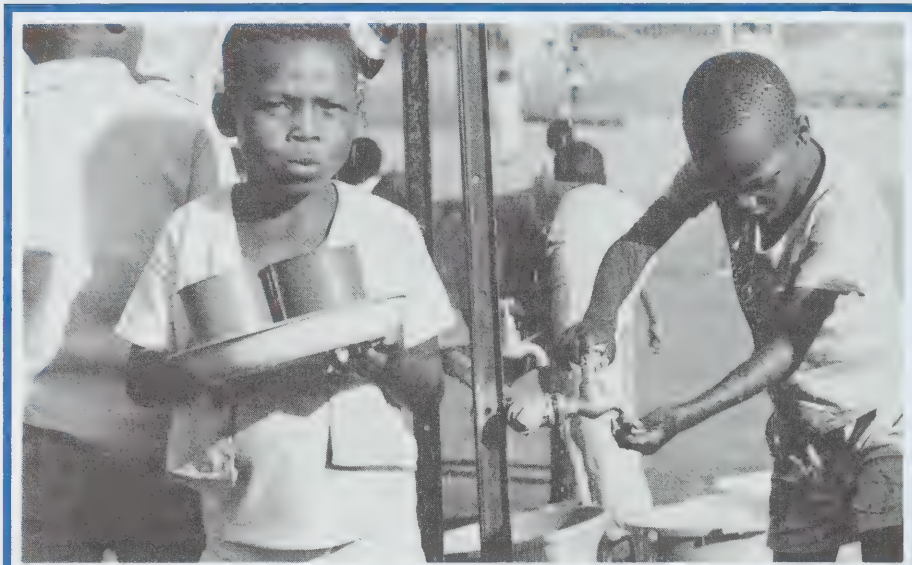
Dr Kistnasamy is keenly aware of the shortcomings of the public health system in South Africa but he is nevertheless optimistic that things can change, especially in knowledge about AIDS. He hopes through the efforts being made by such groups as CHES that "we'll be able to move forward in terms of a brighter future for the children of our country."

David Spurgeon in Ottawa



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The integration of cities should improve such basic services as access to water.

The origins of Kimberley, 470 kilometres southwest of Johannesburg, date back to the discovery of diamonds there more than a century ago. Its affluent heritage is reflected in the areas that are home to the city's 30,000 whites, where paved roads, electricity, and toilets are taken for granted as basic amenities.

Kimberley's remaining population — 120,000 people — live in six surrounding townships, themselves divided along racial lines. Greenpoint is one of the poorest; the average monthly wage is CAD \$115. It has 6 communal water taps to serve its 5,000 residents. There is no water-borne sewage system and toilet facilities consist of 18 buckets placed under chairs with holes. Waste is disposed of once a day.

These racial and economic divisions have been institutionalized by apartheid laws in cities throughout South Africa. But just as political reforms are being discussed at the national level, so are less publicized negotiations taking place aimed at the

integration of cities fragmented by apartheid. Many see these local negotiations as the first step toward the creation of non-racial democratic structures in South Africa.

PLANACT, a local, non-profit service organization, is examining the problems and mechanisms relating to the integration process. IDRC and OXFAM-Canada are helping to fund its research. Formed in 1985, PLANACT works in the areas of housing and urban development policy, primarily on behalf of black community and civic associations and trade unions. In addition to working with groups at the local level, PLANACT is involved with other research organizations in developing national policy alternatives on a range of local government issues.

OVERCOME LEGACY

In trying to create non-racial local governments, black organizations must overcome a legacy of urban development under apartheid. Townships, where most urban blacks live, were originally created as temporary residences for migrant labourers far from white metropolitan areas. Despite the government's intention that blacks return to the "homeland" areas, most people remained in the townships. Infrastructures were neglected and today, townships suffer from over-crowding and inadequate

housing, transportation, and services. And although the Group Areas Act forbidding blacks to live in white areas has been abolished, social and economic barriers hinder any real movement.

Township residents also have no real political rights. But they do have power, as the world discovered in the 1980s when Soweto and other townships organized mass resistance in the form of pass law evasions, demonstrations, and boycotts of schools, businesses, rents, and local institutions. The boycotts were organized by civic groups, grass-roots movements representing the majority of people in the townships. These civic organizations are seen as the legitimate representatives of at least 10 million people in communities throughout South Africa.

It is these civic groups that are negotiating with white-run city councils and regional authorities to reorganize the system of local government. There are actually two steps in the reorganization process, explains Roland Hunter of PLANACT. One is the creation of a single administration in the cities that has the capacity to deliver services. The second step is the creation of a system of representation — a new political structure.

The issue of taxes must also be addressed; in addition to examining structures for non-racial, single-budget cities, the IDRC-OXFAM study is developing a model for a progressive tax system. Blacks work and spend money in white cities due to the limited commercial and industrial development in the townships. The various taxes on goods and services paid by blacks in Johannesburg, for example, help to bankroll the city council's annual budget of about CAD \$900 million. An equalized tax base would help much-needed resources flow into the townships.

ENEMIES MEET

Successful negotiations have taken place on the integration of Johannesburg and Soweto. Boycotts in Johannesburg led to the signing of the Greater Soweto Accord and the creation of a Metropolitan Chamber in September 1990. The Chamber is the first post-apartheid structure to emerge in South Africa. It has brought together sworn enemies — the white provincial authorities and city councils, and the black civics who represent the townships — to plan a new, non-racial local government that could be run on a single budget.

The Metropolitan Chamber meets monthly and includes representatives of utility companies and the private sector as well as the Soweto civics, provincial, and regional authorities.

The success of these talks have led to a proliferation of local level negotiations. There has been a corresponding rise in requests for PLANACT's assistance. Using its research findings, PLANACT helps the local civic associations strengthen their bargaining position. "The Canadian funds go toward a more realistic leveling of the negotiating field," says David Gallagher, African regional representative for OXFAM-Canada. PLANACT is now working with civic volunteers on 30 projects, one of them in Kimberley. After area boycotts in 1990, PLANACT was called in by the Kimberley Civics Association to advise them on urban

development and local government reorganization. The Kimberley Civics Association is made up of elected representatives from each of the local townships. PLANACT facilitated workshops for the civics to help them in their negotiations with the authorities.

FEW RESOURCES

In entering negotiations, civic associations are at a considerable disadvantage. They have meagre resources compared with those available to the state and private sector. The city councils, with vast infrastructure to call upon, often want to move quickly. The civics, on the other hand, have small offices above shops with volunteer staff, no budget, and few people skilled to sit at the table and negotiate with businessmen and long-standing municipal leaders on such complex issues as housing, sanitation, job creation, health, and education. Moreover, the civics want decision-making to be democratically based. It takes time for the volunteers from Kimberley's townships to reach a consensus that is backed by all of the diverse townships they represent so that they are bargaining with a unified mandate.

One of the key aspects of PLANACT's work is to help ensure that residents are involved in the decision-making process. "You have to be careful not to go too fast because this can disempower people in the community," says Peter Cranko, a PLANACT researcher working on the IDRC-OXFAM project. "But, at the same time, if you go too slowly, the authorities have time to take strategic advantage."

In Kimberley, there is a fear that the city council will try to appease township residents by providing enough money to upgrade services and improve conditions. People might acquiesce to short-term gains instead of thinking of the future and full empowerment.

PLANACT is helping township residents work toward this future. In doing so, it takes its direction from people with real and immediate needs, says Roland Hunter. Through meetings, workshops, and discussions, township residents develop skills and expertise that will help them make more informed decisions over the long-term.

The rapid transition happening at the local level is an indication of progress toward the creation of a post-apartheid South Africa. Civic associations are making history in their negotiations to replace the structures of apartheid with democratic institutions. And in the process, township residents may soon see some practical benefits — improved services — and feel even more empowered as they move toward a single administration that guarantees equitable service in the future.

Louise Behan in South Africa



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EATING ON THE RUN

Dhanaji Shinde, a street food vendor in Pune, India, has found a permanent spot for his food cart on a corner of a busy marketplace in the heart of the city.

He has been selling *bhel-puri*, a tongue-tickling snack, from this profitable perch for the last 15 years. Shinde dropped out of school in Grade 3, when his father died. His impoverished circumstances forced him to migrate from his village to Pune in search of a job.

After doing several odd jobs, he found his niche as a short order cook in a small restaurant. By the age of 20, he had accumulated enough savings and business acumen to apply for a vendors licence. "I am happy being self-employed," he says, "There are problems, of course, such as recent price increases, but I still manage to break even."

Mr Shinde is fairly typical of the 4,000 odd street vendors who operate in this rapidly expanding (pop. 2.5 million), highly industrialized city 200 kilometres south-east of Bombay. Shinde, however, belongs to the comparatively lucky minority of licenced vendors — only 1,007 in all. Unlicenced vendors are vulnerable to fines, confiscation of goods, and interference from the police and municipal authorities. And all the vendors are prey to a host of problems like lack of water, shortage of space, inadequate sewage and garbage collection facilities, and the consequent health hazards of unhygienically prepared and served food.

Until last year, few statistics were available on this enterprising section of the informal sector, even though the municipality had received nearly 9,000 applications for licences from street food vendors. Sensing this void, Dr Meera Bapat, a Pune-based researcher and academic, decided to conduct a study which would find out

more about the scale of this activity and its social and economic implications. "I saw street food vending as an easy-to-enter, non capital-intensive industry that was catering to an important need in the city," she says. "Studies conducted in some Far Eastern and African countries have earmarked street food vending as a high employment potential industry,



particularly for women. Eating street food is now beginning to catch on in India as well."

Funded by IDRC, and under the supervision of Dr A.P. Kulkarni, Director of the Centre of Studies in Social Sciences, Pune, the study was published in October 1990. "We had to start from scratch, with a census of the street food vendors," says Yashwant Thakar, a researcher who did the actual fieldwork for the study. This meant traversing the city streets and often going back to the same spot at different times during the day in order to record all the diverse vending activities.

CHANGING CLIENTELE

Mandai, the marketplace where Shinde operates, is a case in point. Every morning, this square fills up with vendors who hawk breakfast food to small businessmen who work and live in the same locality. Snack

sellers like Shinde come here in the early evening, catering mainly to shoppers and families. Later in the night the mood changes as a dozen carts do brisk business selling bread, spicy scrambled eggs, and fried fish to middle and lower class men who frequent the cheap bars in this area.

Other vendors have permanent kiosks and occupy entire streets that exude an upbeat ambience. They are usually located near a public place, like a park or a cinema, and sell more expensive items, including fruit juices and ice-creams, to a well-heeled clientele. Not only are these kiosks licenced, but a large number are owned by officials of municipal corporations.

In sharp contrast to these vendors are the groups of poor women who sell home cooked meals, dirt cheap, to working class people. Squatting on rain-soaked earth, under a flickering street light, they vary their servings according to the money that their customers can afford to pay on a particular day.

Alka, a flower seller who earns a pittance and sleeps in doorways, says that she can feed herself and her two children only because of this happenchance community kitchen. The majority of the clients are male, and according to the study, eat here because they are without proper shelter or cooking facilities.

"For a large section of the poor, it has become a necessity," says Dr Bapat. "The government, however, views street food as a nuisance and adopts a very arbitrary licencing policy for the vendors." Jamunabai, another street meal vendor, has no licence and says she lives in fear of the frequent police raids.

The census of the street food vendors revealed 199 kiosks and 1382 hawkers selling as many as 95 varieties of food. Of this, a sample of 250 vendors was extensively



Spicy snacks for sale in a Pune marketplace. Some 95 varieties of food are available from street vendors in the city.

investigated. The study threw some light on factors like the legal status of the vendors, their level of education, the reasons for starting this activity, the modus operandi, the income generated, the clientele, the environmental hygiene, and food safety and nutritional value. It also showed that although the visible employment of women in this industry was only 13%, in actuality, as paid and unpaid workers they constituted more than 45% of street food vendors.

SURPRISING FINDINGS

The findings relating to food hygiene challenged conventional wisdom. "There is a widely held belief that street food is very unhygienic and spreads disease," says Dr Bapat. "I felt the need for a study that would test these notions." Bacterial analysis of 252 samples of food and water taken from all kinds of street food vendors and restaurants found that restaurant food was no better than street food in terms of contamination.

"Contamination is possible at many points, like an unwashed vegetable garnish on a well-cooked snack," says Dr Bapat. "The street meals, sold under the most unsanitary conditions, were found to be surprisingly

uncontaminated, possibly due to the home preparation factor. On the whole, though, street food carries the risk of infection and this problem needs to be addressed."

The study is the first step in improving the lot of street food vendors. Project researchers plan to hold a series of workshops to disseminate the study's results to the vendors as well as to officials, social workers, NGO representatives, and journalists. Seminars will also be held to train the vendors in basic hygiene.

It is evident that street food vending is a small but viable part of the informal sector in Pune. And though this industry is not without its attendant problems, the study also spells out some solutions. First, street food vending must be legitimised. The report notes that, "since entry into formal jobs is severely restricted in India (particularly at low levels of education), even a small addition to reasonable income-earning opportunities needs to be viewed positively." This legitimacy is crucial, as public and private loans are

frequently needed to start a street vending business. The study also suggests that the municipality adopt a sensible licencing policy and ensure basic amenities to the vendors.

Researchers hope that municipal authorities will act on these proposals and that more attention will come to a long-neglected sector of economic activity. A better and more stable working environment, they say, can contribute not only to the fortunes of the hapless street food vendors but also to the civic health of the city and, in the long run, to the evolving economic policies of India.

Veena Gokhale in India.



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FARMING THE SEA



Seaweed grown attached to a floating raft is ready for harvest at a site maintained by the University of Philippines Marine Science Institute off Santiago Island, Bolinao. Seaweed is the Philippines' third most important fishery export, providing a livelihood to more than 70,000 seaweed farmers.

In the Cape Bolinao region of the Philippines Islands, outrigger canoes gently slice the smooth, small waves on the reef surrounding Santiago Island. It is a peaceful, almost idyllic sight; one that sharply contrasts with the violent weather conditions in this region in December 1990.

At that time, a typhoon hit the Philippines and caused severe damage to one of the main industries in the country: seaweed farming. Seaweed farmers in this area lost thousands of tons of their harvest and a great deal of potential earnings in the typhoon.

But many remained undeterred by Mother Nature and, with the help of the University of the Philippines Marine Science Institute (UP-MSI) at Bolinao, are receiving intensive training in seaweed farming. The UP-MSI, under a study grant from IDRC, is encouraging seaweed farming in Bolinao and other nearby towns of Pangasinan province in the Philippines.

Several villagers will be among the core group of seaweed farmers in the island who will be encouraged this year to try their hand at seaweed farming once again. Although the cape

area is not the major source of seaweed production in the country, researchers decided it would be a good environment for experimentation — far from the onslaught of tall waves and with the advantage of a moderate current. The shallow waters are ideal for the maintenance of waist-deep seaweed farms.

Antonio Calim of Dewey Island is one of the villagers trained for the core group. "Weather — especially typhoons — is a big problem for us," he says of the situation facing seaweed farmers. In 1990, Mr Calim had six rafts of seaweed ready for harvesting before the typhoon struck. He estimates those rafts contained as much as 4,000 kilograms of the Eucheuma seaweed, a significant amount for selling on the market. He lost his seaweeds but not his enthusiasm.

"There are interested buyers, but we simply cannot meet their demands," Mr Calim says. "If we can get together and organize, we stand a better chance of meeting this demand."

Seaweed farming brings to some islanders hope of a bustling local industry and a chance to cash in on the lucrative seaweed trade, third after tuna and shrimps as the main fishery export of the Philippines. In the last 15 years, seaweeds have become an

important Philippine industry, exporting more than half-a-billion pesos in 1989 (27 million CAD) and providing a livelihood to more than 70,000 seaweed farmers.

"The potential of seaweed production in the developing countries of Asia is very high," says Dr Gavino Trono of UP-MSI. "In the Philippines the increased harvest of Eucheuma seaweed from farms has made the country the major supplier of this species in the international market." In 1990, the Philippines exported about USD \$36 million worth of refined and semi-refined carrageenin, a gel-like substance extracted from Eucheuma seaweed. Carrageenin is used in a variety of food products such as ice cream, jams, syrups, and pie fillings. It also has industrial applications.

TRAINING VILLAGERS

The significant export figures are all the more reason to train area villagers in the cultivation of seaweed. The core group were provided with a manual, equipment (metal stakes, mallets, knives, and scissors), supplies (bamboo, stakes, straw, and nylon monolines), and seedstocks to re-start them on seaweed farming. Dewey

Island fishermen, like Mr Calim, provided the bamboo and labor to build the bamboo rafts on which seaweed is farmed, but they were also given seedstocks and some equipment.

Funding for the training and purchase of materials was provided by the Phillippine Council for Aquatic Marine Research and Development and the United Nations Development Program, in conjunction with IDRC.

Traditionally, seaweed culture is done by tying cuttings on lines arranged in rows on the seabed. This "fixed bottom monoline" method of farming is used in the culture of two *Eucheuma* seaweed species — *Kappaphycus alvarezii* and *Eucheuma denticulatum*. In this method, stakes are driven into the seabed. They are spaced 10 m apart in rows. The end of a nylon monofilament line, about 10.5 m long, is stretched between two stakes. *Eucheuma* cuttings (50 – 100 g) are tied to the monolines at intervals of 25 – 30 cm. Each plant is allowed to grow up to 1 kilo or more before harvest. Depending on growth rates, the crop may be harvested after two to three months.

In areas where space is limited, the raft or floating method is used. Introduced in 1989, this method has cuttings floating above the seabed. Here, monolines are attached to a raft, usually made of bamboo. The raft is anchored to the bottom by nylon lines.

The raft method has many advantages. Grazing by bottom animals, like sea urchins and starfishes is minimized, if not eliminated. The seaweeds are raised above the reach of grazers. This grazing has been one of the main constraints on seaweed production. Seaweeds, being nearer the water surface, are exposed to more moderate water movement. The adverse effects of more intense sunlight near the surface is offset by the slightly crowded spacing of the seaweeds.

There are some constraints to seaweed farming, as researchers at UP-MSI and villagers have found out. Seaweed growth varies from season to season, in some months having low levels of growth. Farmers still use poor quality stalks in replanting, resulting in reduced yields. In some instances, the

depressed growth — together with disease — has wiped out the entire crop, leaving farmers without seedstocks for the next cropping. Crop failures mean there will be fewer seedstocks for seaweed farmers to plant. Farmers are then unable to plant for several months. As in Danajon Island in the central Philippines, seedstocks were affordable mostly to big corporate farmers able to buy them at high prices. Small farmers with no seedstocks often have to wait at least another cropping season before they are able to borrow or buy seedstocks at nominal prices from their corporate neighbors.

Traditionally, farmers select only the best looking seedstocks from their present harvest for replanting. But the seedstocks may not be the best for the next season or month. The importance of having seedstocks of the right strain available during the different planting or growing periods is a crucial factor in seaweed farming.

DISEASED PLANTS

There are other constraints to seaweed farming, such as the so-called "ice-ice" disease. It is characterized by general paling and discoloration of the branches, which ultimately become whitish. Tissues in affected portions become soft and eroded and easily break off. Marine scientists at present don't know how to treat the disease in seaweed plants.

Previous studies have found that the "ice-ice" disease is preceded or coincides with the tremendous growth of other seaweed species in the same area. The syndrome is also preceded by low nutrient concentration. Fertilization may partly solve the low nutrient supply but it will be very expensive.

In addition to training core groups of farmers and advising on farming methods, project researchers also wanted to study systematically the types of seaweed in the Philippines for commercial use.

The seaweed industry is primarily based on a few commercially important species: *Eucheuma denticulatum*, *Kappaphycus alvarezii*, and *Caulerpa lentillifera*. Production of *Gracilaria* spp., *Sargassum* spp., *Gelidiella acerosa*, and *Coldium* spp.

currently depends on natural stocks. There are more species that are economically important and others which are potentially valuable. There is thus a great need to study present natural stocks and to encourage seaweed farming. The IDRC-sponsored study surveyed 18 out of 60 coastal provinces. Field surveys recorded 103 seaweed species (out of 158) that were economically important. Some 138 species were collected, of which 81 were important either as food for humans or animals or as local sources of chemical and biochemical products.

The number of species recorded makes up 23% of the total number of seaweeds known to be of economic value in the Philippines. It was the first systematic inventory of seaweed resources in the Philippines.

The study divided the country into two major biogeographic zones based on the distribution pattern of seaweeds, tidal types, the airstreams and their effects on current circulation, and on rainfall distribution. Previous studies have delineated the country into seaweed and non-seaweed provinces without any scientific basis.

The Seaweed Information Center (SICEN), based in the UP-MSI at the Diliman campus in Metro Manila was also established. It specializes in making seaweed information readily available. The SICEN also manages a phycological herbarium. It contains over 50,000 dried and mounted specimens, representing mostly Philippine seaweeds belonging to about 450 genera in 1,400 species.

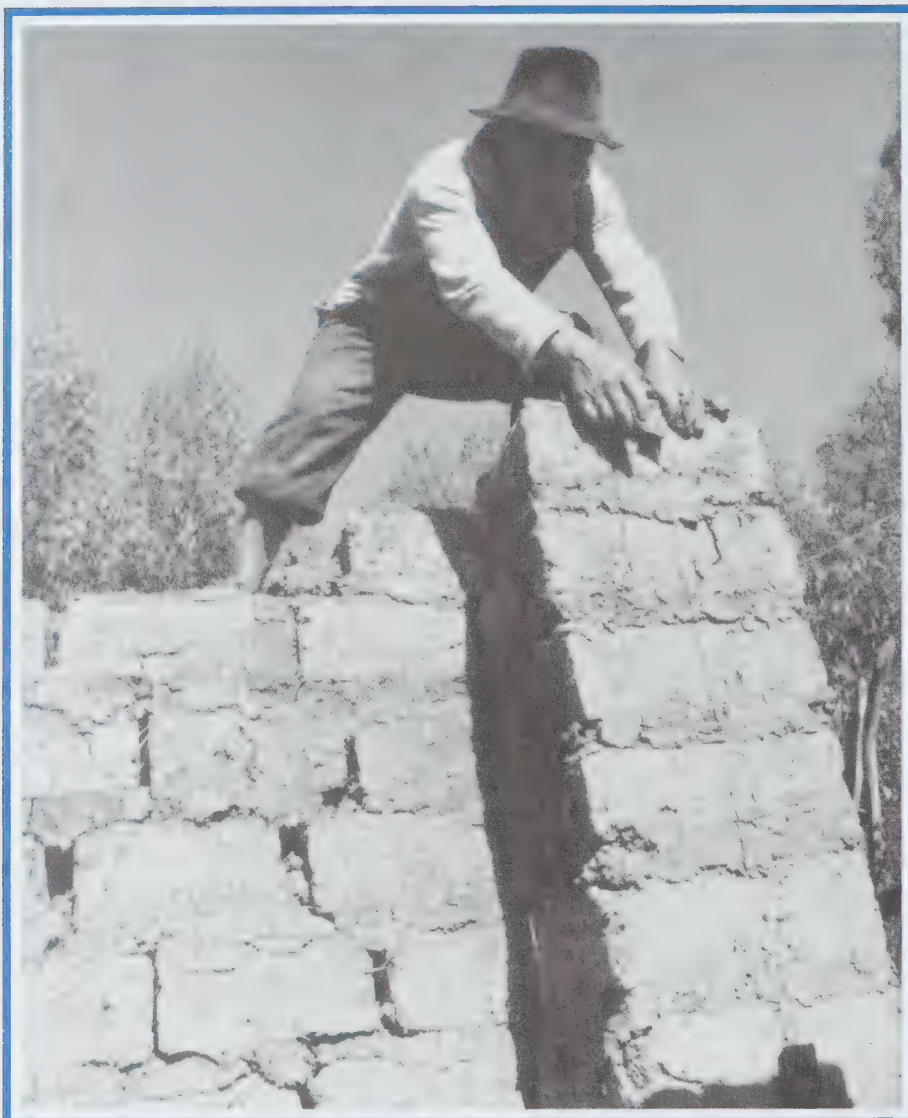
Paul Icamina in the Philippines.



Dr Gavino C. Trono, Marine Science Institute, University of the Philippines, Diliman, Quezon City 3004, Philippines.



WITHSTANDING AN EARTHQUAKE



Adobe bricks, widely used in Latin America, often crumble in an earthquake.

In Peru, as in many other countries straddling the Andes Cordillera, earthquakes make you literally tremble with fear, and with good reason.

The 1970 earthquake, for example, left behind only ruin and misery: 50,000 people dead, 20,000 missing and 150,000 injured, in addition to 60,000 homes destroyed. Although nobody can prevent this type of

natural disaster, one factor that adds to the death toll in the wake of an earthquake is the fragility of adobe houses. Something can be done to improve this.

For several years, a team of researchers from the Civil Engineering Department of the Pontificia Universidad Católica del Perú in Lima have been working toward this goal. In cooperation with the Building Research Centre at Concordia University in Montreal and with IDRC

funding, the team has developed a simple, inexpensive construction technique for adobe buildings that significantly increases their resistance to earthquakes.

"Most of the loss and damage resulting from earthquakes is due to the collapse of adobe houses, where traditional construction methods make them as unstable as a house of cards," says Gladys Villa García, an engineer and researcher at the Peruvian university's Laboratory for Earthquake-Proof Structures. "That is why the primary goal of our work is not to find a means of preventing every kind of crack in the adobe and the mortar, but rather methods of framing the walls so as to prevent them from crumbling in the wake of intense seismic pressure."

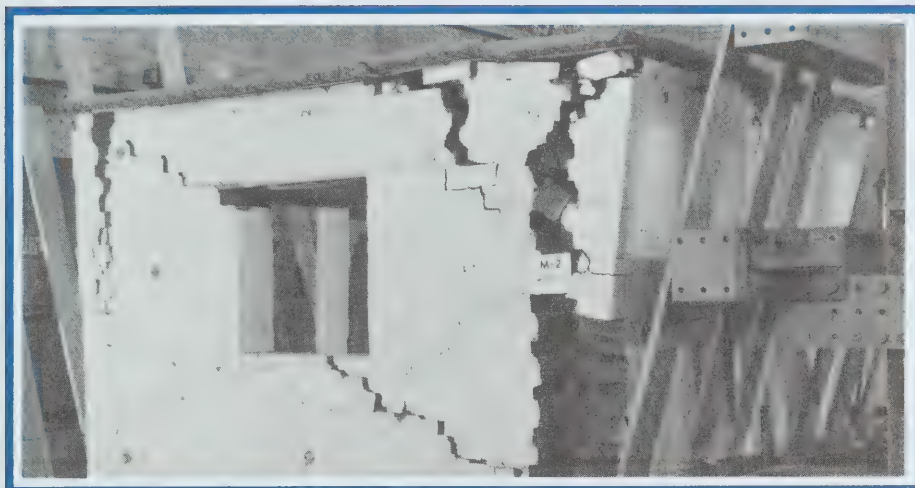
Adobe brick is an inexpensive and readily available construction material. Its use is widespread in Latin American countries, especially in rural areas where it offers excellent heat resistance and acoustic properties. These solid and rigid bricks tend to crack and break apart during an earthquake, causing walls to collapse and ceilings to fall in — the primary cause of injury and death.

A Homogeneous Unit

The researchers subjected an adobe structure to the vibrations produced by a full-size seismic table. They studied the structure's reaction and developed a technique for reinforcing the walls and tying down the roof more firmly, using materials that are inexpensive and readily available and techniques that do not unnecessarily complicate house building.

Mrs Villa García says that it does not matter what kind of mortar is used to cement the adobe bricks: whether it is good quality or not, it will not prevent the housing from collapsing during a strong earthquake, unless each wall has a vertical and horizontal frame that acts as a skeleton for keeping the bricks in place. "The wall must function as one homogeneous unit and not as a fragile assembly of a hundred or so bricks which crumble at the slightest shock," explains Mrs Villa García.

REPORTS



A seismic table simulates earthquake damage to an adobe dwelling.



Many feet make light work. Villagers prepare mud used for adobe construction.



Bamboo poles reinforce the adobe walls.

The frame designed by the researchers consists of vertical bamboo poles anchored to a cement foundation 45 cm apart. Lattice cane is then placed horizontally on the mortar every four or five rows of bricks. The cane is attached to the bamboo poles. At the top of the walls, the vertical poles are fastened to two parallel wooden beams to which the roof joists are attached.

One weakness of traditional construction methods is that the roof rafters are attached directly to the walls, says Mrs Villa Garcia. When these crack, there is nothing left to hold up the roof. That is why it is important not only to strengthen the walls with a grid of vertical and horizontal joints but also to provide beams to help the roof absorb the seismic shock.

To promote the adoption of the new construction methods, the researchers worked with various government and community organizations in Peru to create five prototype adobe houses and test a variety of methods for disseminating the techniques in the field. "If our type of construction should prove too complex or difficult to teach, people will go back to the old way of doing things," says Mrs Villa Garcia. "That's why our work also included evaluating the most appropriate teaching methods. To date, the use of scale models and photographs showing step-by-step how to frame the adobe has produced the best results."

Marthe Lemery in Ottawa



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LIVING INVENTIONS

The life sciences are changing in their fundamental character, and at a rapid rate. The new biotechnologies have made it possible to transfer genetic material between completely dissimilar organisms and to modify living organisms for human purposes more rapidly and efficiently than ever before.

These technical advances have served to blur the distinctions between living and nonliving and between natural and manmade. Intimately connected with these scientific breakthroughs (to the extent that it is difficult to separate cause and effect) is a strong and escalating trend toward the commercialization of the life sciences. There are large profits to be made, and investment capital has been mobilized in a way unprecedented in the history of science.

Biotechnology requires high levels of investment in research, but the results — the intellectual property — are easily and cheaply copied. Investors in research want some form of intellectual property protection to ensure returns on their investments. Plant varieties have been eligible for protection in some countries for many years using plant breeders' rights (called plant variety protection in Europe).

Increasingly, however, industrial-style patents, formerly reserved for inanimate inventions, are being used for living organisms. In most countries where patents are being used for living things, they have been granted as the result of new interpretations of existing legislation and not through new legislation dealing specifically with the issue of patents for life forms.

Patent protection is also available in several jurisdictions, including Canada, for novel genes. As well, the U.S. Patent and Trademark Office has granted patents on a plant characteristic (e.g., high-tryptophan production in maize). The patent claims a monopoly over any high



Small-scale farmers in the South often develop biological innovations. These innovations are not now protected by any codified intellectual property law, and so could be very vulnerable to being improperly appropriated by others.

tryptophan-producing maize regardless of the process by which the overproduction is achieved. Furthermore, U.S. law allows that patents may be granted to anyone who "invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof."

The argument for intellectual property protection is often couched in terms of increasing incentive to research. Two basic philosophies prevail. The first assumes that without social incentives for the development of useful ideas, in reality incentives for research, there would be less investment in research than is socially desirable. The second holds that intellectual property protection is provided as society's part of a bargain with the inventor. The inventor discloses technological secrets that might otherwise not be made available to society in return for an exclusive right to use and profit from the invention for a specified period of time.

In many discussions, these two notions, of incentive and of reward, are melded together. Intellectual property protection is seen as both incentive and reward for invention and disclosure.

The alternative to effective intellectual property protection is to not disclose information or not make "new" biological materials available to prevent competitors from making use of it. Such "Trade Secrets" can be protected by physical measures of secrecy and by restrictive contracts entered into with employees, users, and others to whom the secrets may be revealed. It is this option that concerns the proponents of strengthened intellectual property protection. They argue that, if research is performed by the private sector, some mechanism needs to be in place to guarantee that the fruits of this research are made available to society.

Although this argument appeals to the need to promote research, the motivations and the pressures currently driving the strengthening patent protection for living entities are much more commercial and trade oriented than they are to promoting an effective research environment;

patents are being used to protect investment. This is reflected in the very strong pressures being exerted, especially by the U.S., in bilateral and multilateral trade negotiations, for international "harmonization" of intellectual property protection. Patent protection on living organisms is definitely included.

Potentially more far ranging in its effect is that intellectual property considerations are included as one of 15 negotiating subjects in the current (Uruguay) round of the General Agreement on Tariffs and Trade (GATT). The U.S., E.C., and Japan have taken the position that all things, including plants and animals (with very narrow exemptions) should be considered patentable subject matter. Canada, on the other hand, has (so far) taken the position that certain things should be eligible for exemption at the national level (including multicellular life forms and processes for producing new multicellular life forms).

ETHICAL CONSIDERATIONS

All countries must face the very real prospect that within the GATT, and within various bilateral trade negotiations, patent protection applicable to higher life forms will be included as an almost incidental part of a much larger commercial/trade package. First of all, it must be made clear that patents were not designed for living inventions. Patent laws were drafted before the advent of technologies that made possible the wide genetic recombinations and other genetic manipulation techniques that are now practiced.

The divergence of present practice from the intent of the law is demonstrated well by the difficulties encountered with the disclosure requirements of patent law. Simply stated, patent laws require that an applicant "correctly and fully describe the invention" and the process of making it such that "any person skilled in the art" could reproduce it. That is the deal.

For many living "inventions," however, adequate description is practically or even technically impossible. Even "simple life-forms," such as yeasts or algae, are extremely

complex. To overcome this difficulty it has become common practice in some countries to allow the "inventor" to deposit a sample of the "invention" in lieu of a complete patent disclosure. True, the sample is made available for others to use. Allowing a patent applicant to circumvent the disclosure requirement however, really seems to open the door to patents on organisms that may be novel and useful but that have come about by chance, i.e., the "inventiveness" criterion of the patent may not be met. This does not seem a particularly good bargain for society.

Related to this is a strong "fairness" issue that must be considered. Every living organism is a product of millions of years of natural evolution and, in the case of most domesticated species, considerable human selection and human-induced change as well. Now, by generating a relatively very small change in an organism, it is possible to gain legal control over the exploitation of the modified organism and all of its progeny. What was considered the common heritage of mankind becomes the private property of a few.

Intellectual property law is a product of Western society and Western ideals. Other societies have very different concepts of life and of ownership that may not correspond with those inherent in patent policy. These ideas simply have not been explored adequately. In addition, it must be remembered that the innovation systems in many developing countries are quite different from those of developed countries. In many countries, there are strong informal systems, with small-scale farmers, herbalists, and others, developing an enormous range of useful innovations, many of them involving the use of biological materials.

These innovations are not now protected by any codified intellectual property law, and so would be very vulnerable to being improperly appropriated by others in the wake of strengthened, national intellectual property protection. Patent systems may be difficult for the informal innovators of developing countries to use to advantage, but there is a risk that they may be used to their disadvantage. Finally, patents should,

as an important mechanism of social policy, reflect a society's ideals and maintain traditional values. Yet patenting living organisms seems to run counter to the distinction that most, if not all, societies make between living and nonliving. The effect is a reduced legal definition of life.

COMMERCIAL INTERESTS

Intellectual property protection and the priorities in biological research are increasingly being dictated by commercial imperatives. Strengthened intellectual property is not solely responsible for this trend, but is certainly implicated as an important element in the privatisation of research.

Where short-term commercial interests dominate, there is clearly a comparative advantage to concentrate research efforts in high value areas. In plant breeding this means species of major commercial importance and which are grown over a large area, generally in the more favoured environments. Minor crops that may be of vital importance to resource-poor farmers in diverse and often harsh environments will inevitably be neglected by commercial plant breeders.

In addition to the concerns about the focus of research, there are also concerns about the way research works. One of the first casualties of intellectual property protection is the free flow of scientific information. Related to this barrier to the free flow of information is the equally important barrier to the free flow of germplasm. If a researcher is allowed to use the patented gene or characteristic, there will be a royalty charge levied. Even if access is not denied, the cost of access will inevitably rise. These types of costs could develop to ridiculous proportions as more and more elements are patented, especially in the field of plant breeding where very wide ranges of parent material are employed.

It is important also to note that in response to the increased physical and legal control (perceived and real) of the North over germplasm originating in the South, there have been threats and actual restrictions on the export of germplasm from some countries.

REPORTS



Triticale, a hybrid cereal derived from a cross between rye and wheat. An example of plant breeders' innovation.



Demonstration plots of rice varieties at the International Rice Research Institute in the Philippines. The development of dwarf rice with a high-yield potential contributed to the Green Revolution of the 1960s and 70s.

Developments of this kind, although understandable, are in no one's interest. Plant and animal breeders need as wide a genepool as possible to draw on to adapt varieties to changing conditions for the benefit of all.

Meanwhile, as the costs of accessing the necessary material and technologies rise, with royalty payments all around, so too will the cost of "intellectual property management."

The cost of administration and enforcement of a patent system may also be prohibitive. For example, the U.S. spends over \$300 million to run their Patent and Trademark Office, and Brazil spends US \$30 million on its National Institute of Industrial Property. In the absence of trade pressures, the best strategy for many developing countries would appear to be to not offer patent protection for living organisms and to use instead less strict intellectual property regimes that provide incentives for adaptive innovation.

For research purposes, any technology and any germplasm that can be obtained can be utilized without infringing any laws. Similarly, producers can utilize any materials they can get without paying royalties.

However, without protection, technology holders will be reluctant to transfer proprietary technology or germplasm (an important consideration for developing countries trying to get access to new technology). Furthermore, harvested materials grown from protected varieties are not exportable to countries in which they are protected; and the trade pressures are a reality.

CONCLUSION

In weighing these concerns it is important to keep in mind the ongoing "revision," at least in some quarters, of human relations with the larger environment. This is expressed in a variety of ways, from "deep ecology," through increasing concern for animal rights, to the growing environmental movement. Furthermore, as other countries are brought into Western-style patent systems there will be encounters with a myriad of other cultural perspectives toward ownership of living things. These ideas should be considered as legitimate antitheses to the commercial and trade arguments for patenting.

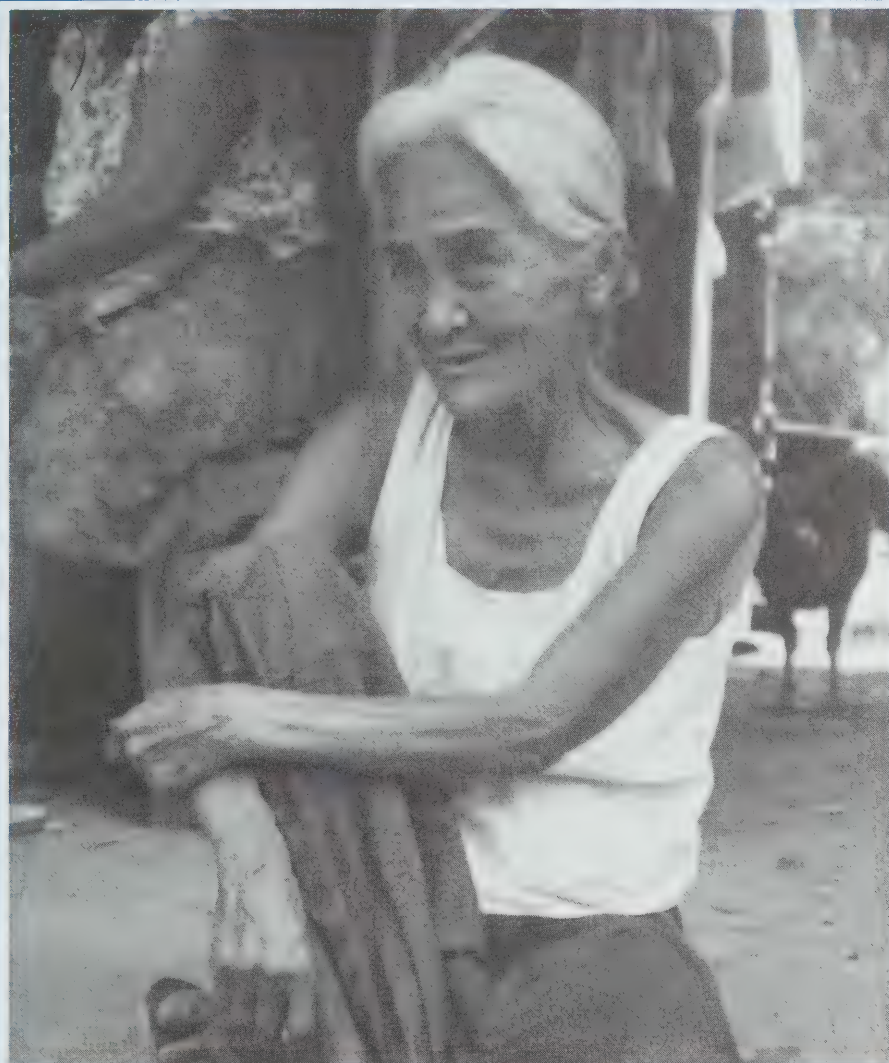
Alternative forms of intellectual property protection could be designed specifically to deal with the characteristics of living organisms. In many ways, plant breeders rights laws

seem to strike an appropriate balance between providing individual incentive and reward for research without seriously skewing the research agenda. Perhaps similar *sui generis* intellectual property protection systems can be designed for other areas of biological research (animal varieties, microorganisms, genes). Another option lies in the petty patent systems employed by some countries that offer somewhat less scope of protection for a less significant inventive step than industrial-style patents. Criteria for such intellectual property systems include offering appropriate incentives to research with the scope of protection limited such that the interests of the larger research system are not compromised too severely in the name of individual research efforts. Still, although modified property protection systems may answer some of the concerns raised here, others — especially ethical concerns — are fundamental to any intellectual property system applied to living organisms.

This article draws on information from "A Patent on Life: Ownership of Plant and Animal Research," coauthored by Brian Belcher who is currently a Research Officer with IDRC.



LAW VS CUSTOM IN THAILAND



Western statutory laws are slowly eroding the customary rights of rural women.

The common assumption that modern legal statutes are more supportive of women's rights than rural customs and traditions is coming under close scrutiny at an IDRC project in northern Thailand.

The project is studying the role of women under long-standing traditions which have the force of "customary laws" and the impact of more recently introduced, "modern" statutory laws.

The initial findings are not encouraging, says the project leader, Prof Virada Somswasdi. "Our assumption is that this external model of statutory law is weakening the role of women in rural society," she says. "Legislators must learn to leave some space for customary law."

More than 80% of Thais live in rural areas and most of them live and die in the same province where they were born. Largely isolated from outside influences, these people have over the generations developed communally accepted rules of allocating resources within the community, of making decisions about development, and of

resolving conflicts. Statutory law is a new development for many rural communities and, according to Prof Somswasdi, it has not been a completely positive one.

She says that discrimination against women has been able to adapt to the advent of statutory law. Statutory laws have made the best inroads in areas where the effect has been to undermine women's traditional rights. Meanwhile, many women remain largely ignorant of those statutes which theoretically guarantee them equality with men.

Prof Somswasdi, who is the chairperson of the Centre for Women's Studies at Chiang Mai University, is carrying out the research with the assistance of two colleagues at the university, economics professor Benchavan Thongsiri and sociologist Shalardchai Ramitanondh.

The Thai researchers are surveying households in three villages in Chiang Mai province. Results of this study will ultimately be compared with similar IDRC studies being carried out in China, Africa, and India.

UNDERMINED RIGHTS

The Thai study is the only one focusing on inheritance, community political participation, and family law. In at least two of these areas — inheritance and the family — recently introduced statutes based on Western models have undermined Thai women's traditional rights, at least in rural areas where customary law formerly held sway.

One of the key forms of social consensus in traditional rural Thai society has centred on the family. Traditional Thai society is matrilineal — upon marriage, a man goes to live with his wife's parents. Only after proving his responsibility by working their land with them for several years is he given a piece of his own land.

Matrilineal tradition also provides that the youngest daughter in the family remain with the parents and care for them until they die. In return, she inherits most of their property. Actually, custom specifies that this applies to the youngest child, but a son who is the youngest is expected to marry and stay with his wife's family.

In 1932, the end of absolute monarchy led to the creation of Thailand's first constitution. A civil code introduced at the same time contained inheritance provisions, still in effect today, which give all children equal claim to an estate, unless otherwise specified in a will.

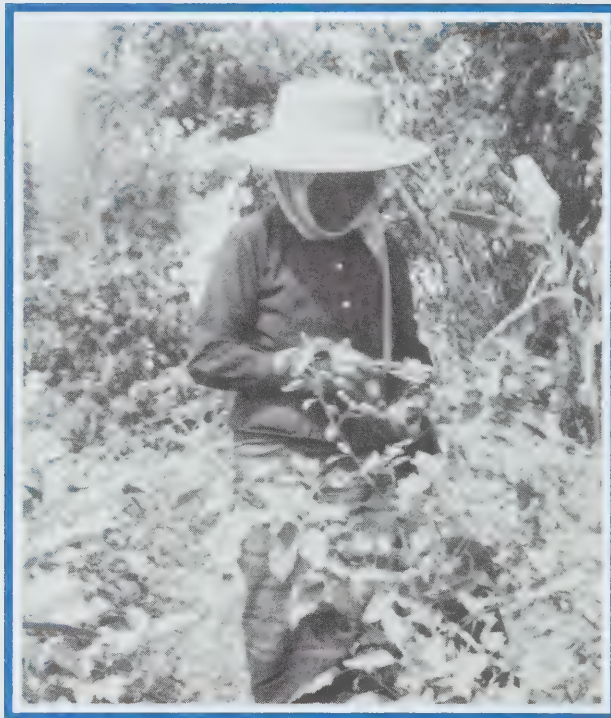
Because many rural Thais still consider it bad luck to think about one's own death, few prepare a will. The survey found several cases in which a family's youngest daughter still had to care for her parents, but ended up with little inheritance upon their deaths because the rest of the children had claimed their shares.

Prof Somswasdi notes that the new system has implications for more than just the youngest daughter. "Now the children have turned to using the law to demand their legal rights and the productive land is divided into pieces too small to work on," she says.

Village practices also show that customary law has a flexibility that is absent from the modern legal system. In one family, for example, the youngest daughter already had a large piece of property, so the youngest brother, a bachelor, was given inheritance of his parents' property. Although the legal system normally requires the villagers to take such issues to court, most remain oblivious to or ignore the statutory laws, preferring customary methods. The respect commanded by the traditional method of consulting village elders allows conflicts to be settled by consensus.

"People don't know the statutory law," says Prof Somswasdi. "Unlike the custom, the law does not have any relation with their lives. Rural villagers have lived with, and been raised by, these customs for years."

Not that the rural system of customary law is above criticism. Traditionally, women have been encouraged to participate in service-oriented community activities, like food preparation or temple beautification, but barred from policy-making. Women, for example, are recruited to make offerings to the temple, but cannot sit on temple affairs committees that consider finance and administration.



Law and practice don't recognize that most Thai farmers are women.

SOME BENEFITS

And, in some cases, statutory laws have been beneficial in increasing the status of women. One statutory law which seems to have had an unqualified positive effect on women is a local administration law of 1982 allowing women to be appointed sub-district (tambon) and village (moobaan) chiefs. Today, more than 800 women have been appointed to these positions, mostly in Thailand's northeast.

It's worth noting, however, that women are frequently barred from climbing higher up the administrative and political ladder, Prof Somswasdi says. The number of women parliamentarians in Thailand is extremely low. In the July 1988 elections, only 11 women were elected out of a total of 357 seats. No less a person than a recent interior minister has been quoted as saying that women are not fit to hold higher positions simply because they are women. It is for these reasons that initial conclusions from the study by Prof Somswasdi and her colleagues indicate that well-intentioned attempts

to bring "modern" statutory laws to Thailand may not have the intended effect. Examples like family relations and inheritance serve to show how newly introduced laws can be counter-productive, disrupting traditional patterns of community relations.

"The pace of this newly introduced, modern legality is so fast that Thai society, urban or rural, has been hard-pressed to adapt," says Prof Somswasdi. "In some cases, women have been further discriminated against in this period of adjustment. We are hoping in this study to redress that situation and regain balance between customary and statutory law."

Mark Timm in Thailand



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GREEN GOLD IN AFRICA



A year's growth produces a canopy of bamboo. More cultivation of bamboo could benefit Kenyan artisans and farmers.

Thick, verdant clumps of young bamboo tower 4 metres above the ground and fan out evenly across the sandy field. One would expect to find this scene in the tropical forests of Southeast Asia or India, but these distinctive grasses can be found just outside of Malindi on the coast of Kenya.

Researchers with an IDRC-funded project are examining the feasibility of importing various species of bamboo from Asian countries and growing them on a widespread scale. The key objectives are to select suitable species of bamboo for several ecological areas in Kenya and to develop techniques for their mass propagation. The project's leader, Dr Bernard Kigomo, has been asking a question of great importance to both Kenyan farmers and the rural cottage handicraft industry: if bamboo is grown and widely used in the tropical climates of Asia, why not Africa? Answering this question has led him down a four-year

path of research. Through his position as Principal Forest Ecologist at the Kenya Forestry Research Institute (KEFRI), Dr Kigomo started the bamboo project in 1987. In travels throughout India and Southeast Asia, he has consistently been impressed with the versatility of this resource. "The potential value of bamboo to Kenya is great," he says, "especially when you go to a country like Thailand and see how widely it is used there. It is like green gold."

CRADLE TO COFFIN

In many Asian countries, like Japan, Indonesia, Taiwan, and Thailand, bamboo is literally used from the cradle to the coffin. In India it is combined with eucalyptus pulp to make paper and in the Southeast Asian countries its uses include fishing, fencing, furniture, fodder, farm implements, textiles, building, and boat construction. In China, Taiwan, and Japan, bamboo shoots are even used for food. "In these countries bamboo is used as a money-spinning, multi-purpose crop," says Dr Kigomo. "But because Kenyan foresters lack knowledge about the economic potential of bamboo, they have rarely tried to cultivate indigenous species or

even import exotic ones." Bamboo is not foreign to the tropical and sub-tropical regions of Africa. An indigenous species, called *Arundinaria alpina*, is found in Kenya and several other species exist in other countries of East Africa. The native species in Kenya was extremely popular in the making of baskets used for tea picking and collecting fruit. Farmers also made fences out of bamboo to keep animals off their land. For the limited bamboo Kenya naturally offered, its use was, perhaps, too popular.

NEAR EXTINCTION

The Kenyan government had to impose a ban on the cutting of bamboo in 1986 — at this point, the country's only indigenous species was nearing extinction. The problem with the indigenous bamboo, says Dr Kigomo, is that it mainly grows at altitudes higher than 2,300 metres above sea level. Concentrated areas of the native bamboo were over-exploited by artisans looking for raw material and by farmers settling in mountainous areas. Kenya now only

has about 150,000 hectares of the indigenous species in irregular patches on the Timboroa Plateau, and in the Aberdares, the Mau Ranges, Mt. Kenya, and Mt. Elgon.

Recognizing this serious situation, Dr Kigomo and other researchers decided to try importing bamboo species from Asia and grow them in Africa. In the first phase of the project, researchers with KEFRI looked at the current state of bamboo in Kenya and East Africa and began to import species from various Asian countries. Kenya's forestry institute now has 24 Asian species of bamboo that it has been experimenting with at its nine trial sites across the country's lake, central, and coastal regions. Varieties of bamboo from Indonesia, India, Japan, Malaysia, and Thailand have been transferred to the Kenyan trial sites to see how well they grow in different climatic and environmental conditions.

TRANSPLANT PROBLEMS

This process of importing bamboo, Dr Kigomo notes, has not been easy: "Bamboo can be difficult to transfer from continent to continent because they are species that do not seed regularly." KEFRI does, however, maintain a storage bank where they keep seeds from different species in cold rooms. Researchers have also tried other transfer methods, like transporting cuttings and rhizomes of bamboo by plane.

Availability of seed has not been the only obstacle to the project. Some imported bamboo species have not adapted successfully to the Kenyan environment. Termites, which can destroy bamboo clumps in the space of days, have also been a problem, particularly in hot and dry trial sites. Dr Kigomo says that, although termiticides have been used by KEFRI, soaking bamboo in water is still the most effective method of preventing these insects from destroying the grasses.

These setbacks are all part of the trial and error process that Dr Kigomo views as necessary in increasing knowledge about bamboo in Africa. The pay-offs, he says, are well worth the effort. "With the bamboo's fast growth rate, one can actually harvest

raw material in just one or two years, whereas trees take four to five years — often longer — before they can be cut." The trial plots at KEFRI's Gede site on the east coast of Kenya show that there are several species of bamboo that can adapt quite successfully to the African environment. Here, species from Thailand, Indonesia, and India have all adapted well to Kenya's environment. In particular, *Bambusa blumeana* has grown at an astonishing rate. In just one year, this species from Thailand reached a height of over 4 m and displayed stems with a diameter greater than 6 cm.

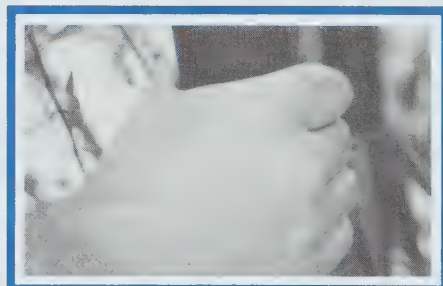
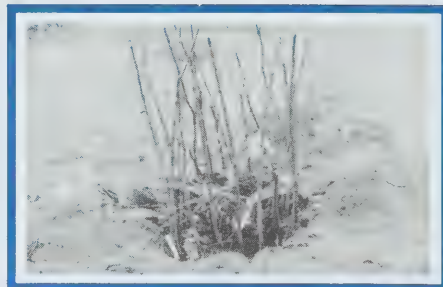
Other species such as *Bambusa arundinacea*, *Dendrocalamus membranacea*, and *Dendrocalamus strictus* are also impressing researchers with their rapid growth rates and quick adaptation to the East African environment.

HALT EROSION

This fast growth holds out great potential not just to the handicraft industry but also to Kenyan farmers who can use bamboo as a means of halting soil erosion. Bamboo can tie up the soil in certain degraded areas and allow the ground to soak up water instead of causing it to run off into eroded areas. Bamboo, as yet another example of its versatility, can even be used as windbreaks to protect crops from high and persistent winds, especially in the coastal regions.

Because of the great opportunities bamboo offers to Kenya, Dr Kigomo and fellow researchers at KEFRI have started a second phase of the project with help from IDRC. They will continue research on different varieties of bamboo and their adaptability to ecological conditions, but researchers are also interested in spreading their results to rural communities and increasing the visibility of bamboo across Kenya.

For the past two years KEFRI has worked with at least one farmer at each of the project's nine trial sites. In western Kenya and the lake region, farmers are becoming increasingly involved in planting and cultivating



Bamboo shoots protected by sticks can rapidly grow into poles measuring more than 6 cm in diameter.

bamboo at demonstration stations. Now, researchers are interested in involving more farmers through bamboo workshops and demonstration at the forestry stations.

The project also wants to include the domestic handicraft industry, which stands to gain much from increased bamboo planting. Project leaders have given artisans bamboo at cost to make crafts for display at the KEFRI forestry stations.

Dr Kigomo knows that the knowledge base in Kenya concerning bamboo has been weak in the past. "Too often we have been sitting on this gold instead of using it," he says. His research at KEFRI is helping to change this. And if the past four years are any indication, it is not unreasonable to predict that in 10 years time bamboo may well be a flourishing part of Kenyan forestry and agriculture.

Craig Harris in Kenya.



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SOUTHERN EXPOSURE

The arrival of 150,000 immigrants in Canada each year rapidly transforms the social mix of Canadian communities. In 10 years, entire neighbourhoods have radically changed; schools that were once relatively homogeneous now have student populations representing 40 to 50 ethnic groups.

Teachers recognize this diversity as a great resource that enables them to introduce a global perspective to their classrooms. At the same time, educators have had to establish various programs and activities to help students adjust to the changing social environment. Many teachers feel they have not been adequately trained to meet these new demands on the educational system.

IDRC's Summer Institute, launched in 1990, responds to this need. The Canadian educational establishment welcomed the initiative, which aims to introduce teachers to the role of scientific research in international development.

Educators applying for the program must submit a project outlining how they will share the experiences and knowledge gained during the trip upon returning to Canada. Since openings for participants are limited, IDRC chooses the candidates based on the quality of their projects. The program begins at IDRC's headquarters in Ottawa, where the educators are introduced to specialists in such areas as economics, health, and the environment. Subsequent discussions revolve around topics that include sustainable development, development ethics, immunization, and literacy.



Canadian teachers help villagers install a pump.

The 1991 Summer Institute was held in Costa Rica. The group soon realized that researchers there do not confine themselves to ivory towers. They are found throughout the country, be it at research centres or in the communities whose problems they are trying to solve. More than 30 specialists — agro-economists, geologists, biologists, socio-community workers, educators, and biotechnologists — met with the group to explain their work and to guide them about their research sites.

Until their trip to Costa Rica, most of the institute participants had only seen developing countries as tourists. The Summer Institute's itinerary, however, goes well beyond the typical sightseeing agenda. The teachers learned about tropical flora and wildlife, banana cultivation, rice growing in arid lands, the exploitation of fallow lands, the isolation of an island fishing colony, the erosion of deforested mountain slopes, and underdeveloped socio-economic environments.

Many of the teachers collected materials — booklets, postcards, local knick-knacks, newspapers, and photographs. Back in Canada, these help to describe a culture to those who can hardly imagine its existence. But the teachers' memories provide the richest educational resource. Upon

returning to the classroom or office, group members draw examples from their stay in Costa Rica to teach biology, physics or human sciences; they use data on the health of the people of Costa Rica; they explain how they installed a water pump in the El Palmer community; they describe the functioning of a school in the South, the marketing of bananas, and the massive spraying of pesticides.

Throughout our trip, we observed the extent to which researchers share the concerns of the communities in which they work. In the Gulf of Nicoya, they worry with the fishermen about the exhaustion of ocean resources. In a small village, specialists work to overcome drinking water problems. On banana plantations, they are

alarmed about the impact of massive pesticide spraying on the health of the plantation workers.

As days go by, the group becomes increasingly convinced of the value of the researchers' contribution to the communities. People living in these communities are preoccupied with daily survival; they have neither time nor energy to engineer long-lasting improvements to their lives. The researchers, engaged by communities in the task of solving their problems, play a basic role in the development of these populations.

The experience in the South forces participants to question codes, standards, certainties, and behaviour. It is an effective means to make teaching and learning in Canada more responsive to multiculturalism and global development. It is a bonus that these lessons are taught in a beautiful classroom — participants carry with them memories of stunning landscapes, magnificent birds, the sun and warmth, exotic animals viewed in their natural habitat, the excursion on horseback or aboard a canoe in the middle of a tropical forest...all accompanied by the hope that development is a realistic aspiration.

Raymond Laprée, a participant in the 1991 Summer Institute.

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CANADA

Ten years into
the debt crisis

IDRC REPORTS



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In August, 1982, Mexico announced that it could not make the interest payments on the US\$80 billion it owed to external creditors. It was the first major debtor country to default on its loans and its difficulties marked the beginning of a larger debt crisis. In the following ten years, more developing countries stopped or delayed interest payments on their debts.

Concern mounted over the extent of the problem, as did the number of proposals to resolve the crisis. Some of the most controversial measures used to control debt in the South were the austerity programs associated with structural adjustment. These programs ushered in lower wages, price hikes, food shortages, and in some cases, civil unrest. The poor had to struggle even harder for survival; their suffering found expression in public protests that occasionally erupted into violence.

Today, the picture looks more optimistic as several countries, most notably in Latin America, are recovering from their debt problems. Economic indicators show signs of revival and growth. Some commentators have gone so far as to say that the debt crisis is over.

But is it? Not all Latin American countries have managed to control their debt and it is not certain whether the success stories of the region will continue. The poorer developing countries, particularly those in sub-Saharan Africa, are still crippled by debt. They have come to depend on multilateral institutions such as the World Bank and the International Monetary Fund as lenders of last resort. The result is that these creditors are getting more money in debt payments than they are giving in new (and much-needed) loans. And with greater demands being placed on global financial resources, smaller countries' share of investment capital may shrink even more.

The economists writing in the following pages discuss these issues and make it clear that efforts must continue to reduce burdens of debt. The crisis may have abated on several fronts, but debt has not yet ceased to be a threat to development in the South.

Editor in Chief

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Cover photo : Neill McKee



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Information on the activities of more than 200 international development organizations is now available on CD-ROM.
Mary Campbell



UNDERSTANDING THE DEBT CRISIS

Economic historians tell us that debt crises are not unique to this century nor to developing countries. But the crisis brought on by Mexico's default on its debt payments in 1982 was in a world far better equipped to deal with the problem than ever before.

Collectively, the developed world has the resources, institutions, and mechanisms to resolve the issue more expeditiously than has been seen to date. By one estimate, 350 distinct proposals to deal with less developed country (LDC) debt had been put forward by the end of 1989. As a result, the combination of realized piecemeal solutions — ranging from forgiveness and abrogation on the one hand, to more choreographed re-schedulings on the other — have changed the nature of the “debt problem” today.

The four articles in this issue deal with different aspects of the same theme — a status report, if you will, ten years after the crisis began.

As a brief acclimatization to the problem, consider these numbers. At the end of 1991, the developing countries' total debt stock stood at US\$1.3 trillion, with the countries of Latin America and the Caribbean owing a third of the total. Roughly half of the long-term debt is held by official sources (meaning multilateral and bilateral institutions such as the World Bank and the International Monetary Fund). Private creditors account for the remaining amount. This average, however, masks regional variations. In sub-Saharan Africa and South Asia, private creditors hold only about a quarter of total debt whereas in Latin America, they account for two thirds.

Measures of the debt burden also highlight regional differences. The ratio of interest payments on debt to the value of exports ranges from 2.1% for the developing countries of Europe and the Mediterranean to 16.4% for Latin America and the Caribbean. Total outstanding debt as a proportion of gross national product ranges from

about 30% for South Asia to more than 100% for sub-Saharan Africa.

REGIONAL RELIEF

Given that the bulk of the problem is concentrated in Latin America (and there in the three largest countries), it is not surprising that the most concerted efforts at a managed resolution of the debt crisis have focused on this region. Dr Stephany Griffith-Jones describes and evaluates the Brady

Initiative, which offered creditors choices in how to reduce their exposure in a country, and gave the debtor the corresponding debt relief. The Brady approach must be contrasted with other efforts to manage the problem in the region. Dr Griffith-Jones outlines the case of Chile, where a combination of severely disciplinary macroeconomic policies, an export boom, and the innovative use of such



Many countries have reduced spending on social services in the face of increasing debt.

	Interest payments as percentage of exports	Debt outstanding as percentage of GNP
All developing countries	9.8	38.4
Sub-Saharan Africa	9.5	106.1
North Africa and Middle East	14.0	82.9
Europe and Mediterranean	2.1	36.3
Latin America and Caribbean	16.4	37.4
East Asia and Pacific	6.0	25.2
South Asia	13.7	29.6

measures as the exchange of debt for stock reduced the country's debt burden outside the Brady, or any other internationally organized, context.

In almost all the countries where the debt burden has been reduced through concerted official action, direct and indirect benefits have followed. Dr Griffith-Jones lists the direct benefits as the reduction in a country's debt burden — 35% debt relief for Mexico, and up to 62% relief for Costa Rica. The indirect benefits include lower domestic interest rates (as pressure on the exchange rate eases), encouraging higher levels of domestic investment and the return of foreign direct investment and capital flight to the country.

Although not all countries — and particularly not the smaller ones — can expect to achieve the same success as Mexico and Chile, this scenario must be compared with the alternative of continuing in arrears, snubbing the international financial community, or dragging out negotiations over long periods of time. For examples of one or more of these, consider the cases of Argentina, Bolivia, Brazil, or Peru. In light of this, Dr Griffith-Jones concludes with a call to all concerned parties for more intensive — and creative — approaches to resolve the issue decisively.

The situation in Latin America has improved dramatically. In Asia, the crisis was always confined to a few countries. But in Africa, where most countries are afflicted with unmanageable debt, the crisis continues unabated. Prof S. Ibi Ajayi makes this

clear in his summary of the Nigerian case.

Nigeria, by virtue of its size, always seems to dominate the scene in sub-Saharan Africa, and the same is true on the debt front. Although its debt is much more weighted to private sources than in other countries in the region, its general predicament is very similar. Years of wrenching adjustment are taking their toll. People are wondering if there really is a light at the end of the tunnel. Prof Ajayi describes a few key elements for an eventual solution, but his paper is, above all, a succinct reminder that the battle rages on.

MULTILATERAL POWER

Judged by the raw numbers, the multilateral institutions may not seem like big players in the debt game. Although the situation varies in individual countries, less than a fifth of the developing countries' total debt stock is due to the multilaterals. However, this belies the multilaterals' true power and role in the resolution of the debt crisis. Their loans carry with them a "seal of approval" which then leads to lending from other sources. The input of the multilaterals — in particular the International Monetary Fund (IMF) and the World Bank — is critical before, during, and after debt negotiations. Furthermore, for the smaller and/or poorer countries, especially in Africa, the multilaterals hold the bulk of the debt. Finally, the Brady Plan, and other official initiatives modeled on this approach, effectively replace bilateral with multilateral debt.

Dr Roy Culpeper examines the role of multilateral institutions in the debt crisis, keeping in mind that their services are not everywhere and always appreciated. Leaving aside the contentious issue of conditionality — meaning the nature and quality of the advice a country must accept before it earns the coveted "seal of approval" — Dr Culpeper outlines the salient characteristics of owing money to the multilaterals. For various reasons, multilateral debt cannot, in principle, be rescheduled. During the height of the crisis, there were net transfers of capital *from* the developing countries to the multilaterals.

To alleviate the situation for the debtor countries, Dr Culpeper suggests a number of changes. The IMF could increase its lending resources by selling its stocks of gold (an idea endorsed by the organization itself). Grace and amortization periods could be lengthened, providing some relief to debtors without affecting the income — and thus the credit ratings — of the multilaterals. A larger proportion of the multilaterals' (substantial) profits could be ploughed back into a debt relief operation. Clearly, needy countries could be identified and given meaningful debt relief, thus easing the burden where it is most severe without affecting the multilaterals' balance sheets.

Perhaps more radically, Dr Culpeper suggests that the classic Bretton Woods distinction between dealing with temporary balance of payments crises (the job of the IMF) and providing longer-term development finance (the job of the World Bank) be done away with, in light of the obvious links between the two issues. At the very least, this would involve a radical restructuring of the IMF's operations. At the most extreme, it would mean the abolition of the IMF.

SAVINGS SHORTAGE

With or without the multilaterals, there exists an international market for capital, where suppliers (creditors) and consumers (debtors) interact to arrive at a price (the interest rate) and quantity. Dr Peter Pauly's article examines this global market and the growing concern over an apparent global shortage of savings. On the demand

side, the restructuring of the economies of Eastern Europe and the Commonwealth of Independent States (the former Soviet Union) will put greater pressure on the pool of available capital. This pool will shrink, as the two principal providers, Germany (owing to unification) and Japan (due to an aging population) generate smaller surpluses.

At the same time, other factors are operating to increase available savings and reduce the demand for them, including lower military spending. Dr Pauly argues that the overall gap between planned savings and desired investment is unlikely to be very large, and is even less likely to be a critical factor in determining the prospects of individual countries. Instead, more attention should be paid to domestic savings rates, the ones that national governments have more influence over anyway. But, as is so often the case, the weakest countries are the most vulnerable to the international context, and Dr Pauly reserves a plea for the plight of the small developing nation.

ROLE OF WEST

This, then, is the debt crisis as we see it today. This set of articles does not claim to have dealt with the issue in its entirety. But the salient features have been outlined. One common link emerges through all the papers, and that is how much of the solution still lies within the West's grasp. Granted, a stable political environment and sensible economic policies in developing countries are pre-requisites for success. But they are only necessary, not sufficient, conditions for success. The rest, as each article points out, depends on *creditor* countries and institutions seeking a solution — through flexibility during negotiations, adapting institutions to changing realities,

and recognizing the highly integrated nature of today's world.

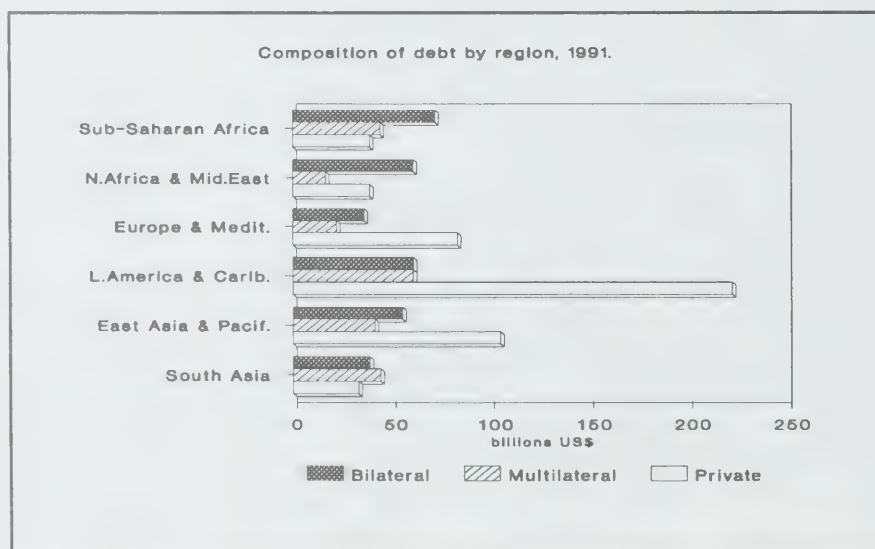
Some issues remain outstanding. It is not entirely clear whether the headlong rush of the international community into the East is foresight and recognition of the opening of a "new frontier," or the start of yet another "debt crisis." For that matter, what is the future of the developing countries after Brady? And what of the ones that are not big enough, developed enough, or strategically important enough to command the attention of the international financiers? Finally, even if the current crisis were thoroughly resolved, are the structures now in place to prevent this from happening again?

Ultimately, the debt issue has two dimensions. First, the existing situation remains to be completely resolved. Using the generally accepted criterion of "return to creditworthiness," the debt crisis is not over for many LDCs (and particularly those in Africa), as they are still not "bankable" in the eyes of the international financial community.

Second, measures must be taken to ensure such a crisis does not happen again. No doubt, a properly functioning market must have winners and losers. Not every loan that is made can be collected, and not every delinquent should expect charity. That said, more work needs to be done to design responsive institutions and to develop mechanisms for the efficient provision

of information to the markets and to the players involved, before one could say with confidence that a debt crisis of this magnitude could never recur.

Robinton Medhora, Program Officer, Economic and Technology Policy Program, Social Sciences Division, IDRC.





LATIN AMERICA ON THE ROAD TO RECOVERY

During the 1980s, Latin America's debt became a major obstacle to economic growth and development in the region. Countries were paying out more in servicing their debts than they were receiving in loans and investment. Finally, however, this trend appears to be reversing.

A study by the OECD estimates that in 1990, net transfers of resources to the region were positive for the first time since 1983, amounting to US\$10 billion. This encouraging statistic can be mainly attributed to the

amount of new money flowing into Latin America. The OECD estimated that private capital flows to the region grew by more than \$8 billion in the year 1989–1990. Unfortunately, these large increases have reportedly benefited only a few countries, namely Chile, Colombia, Mexico, and Venezuela. But should this trend continue and become more widespread, Latin America's debt crisis could be overcome.

The countries that are attracting private money are perceived to have solved their debt problems. Other factors, however, have also played a role in creating a favourable climate for investment. These include stable macroeconomic policies, promising forecasts for economic growth, the

existence of private borrowers with good credit, and in the case of Mexico, the prospect of increased economic integration with the US.

For some countries, there appears to be a strong relationship between reduced payments for debt servicing and bigger capital flows into the economy. This combination in turn leads to greater foreign savings, one of the keys to a country's economic recovery along with increased domestic savings. Economic growth, fueled by investment and debt reduction, now seems possible in Latin America.

BRADY DEALS

Different countries in Latin America have approached debt management with varying strategies and degrees of



Smaller Latin American countries such as Ecuador, which "don't matter" to commercial banks, might not share in the region's general economic recovery.



An increase in exports since 1985 has helped fuel the growth of Chile's economy. In particular, there has been a rapid rise in fruit exports.

success. Several countries have tackled their debt problems according to remedies prescribed by the Brady Plan. Launched in 1989 by the US Treasury Secretary, Nicholas Brady, the plan aimed to reduce developing world debts to commercial banks by promoting internal reforms. Argentina, Costa Rica, Mexico, Uruguay, and Venezuela have all signed Brady deals. Mexico was the first country to sign three years ago. Some assessment of the plan's results is therefore possible.

In December 1988, the Mexican government initiated talks with its various external creditors, amounting to approximately 500 banks. The government wanted to reduce the disproportionate amount of money leaving the country in debt payments com-

pared with loans and investment coming into Mexico. The government also wanted to obtain a multi-year agreement on debt payment that would alleviate the uncertainty caused by recurrent negotiations. The Brady deal that resulted from these meetings led to substantial savings in cash flow, savings that are estimated to reach about US\$4 billion for 1990 to 1994. More than half of these savings are due to new money and a restructuring program that delays payment of some of the principal until a one-shot payment in 2019.

Debt management strategies prior to the Brady plan could have achieved similar savings. The Brady deal did, however, free up enough foreign exchange to stimulate economic

growth, even though the reduction in external debt and debt servicing was limited and significantly smaller than Mexico had requested. But more importantly, the deal has restored confidence in the Mexican economy and relieved uncertainty about its future direction, at least in the short-term. Soon after the Mexican Brady package was announced, domestic interest rates fell by almost 20%, mainly because of reduced pressure on the exchange rate. Interest rates have remained approximately at this level ever since, to the benefit of the Mexican government. Its interest payments on the country's US\$54-billion debt have dropped by more than \$9 billion, representing 4.5% of Mexico's gross domestic product (GDP). The slide in interest rates also stimulates greater domestic investment in the country's economy.

Mexico is also attracting more foreign investment as a result of the Brady deal. Moreover, capital that flowed out of the country when economic prospects looked bleak is now returning. In 1989, an estimated US\$2.5 billion of capital flight came back to Mexico, rising to \$5 billion in 1990. (Other factors, however, such as the expectation of a free trade agreement with the US and Canada, have played a part in drawing foreign investment to Mexico.)

SIMILAR BENEFITS?

Mexico has obviously profited from its Brady plan, but can other countries that reached similar deals reap the same benefits? Uruguay and Venezuela signed Brady deals that follow roughly the same pattern set by Mexico. The Venezuelan deal had some interesting innovations, such as a new instrument that reduced interest to below fixed-market rates for five years, thus providing some temporary debt service relief. The deal, however, was even less favourable than Mexico's in creating cash flow relief, although new private capital seems to be coming into the country. The Costa Rican debt deal, even though in the context of the Brady plan, differs from the Mexican, Venezuelan, and other packages. Cash flow savings on interest payments are very close to being non-existent because the country had not been

servicing the debt in full for several years. The deal resulted, however, in major reductions of debt and debt servicing, which may improve private sector confidence in the economy both at home and abroad. The deal has also removed external debt negotiations from the agendas of senior policy-makers, thereby eliminating a highly demanding, time-consuming and costly activity.¹

STALLING TACTICS

Costa Rica's deal with its creditors, its simultaneous efforts to carry out prudent macroeconomic policies and the bargaining tactics used by its officials to reach the government's debt management objective (including stalling tactics with respect to debt payment) all offer interesting lessons to other small country debtors. Indeed, unilateral action to reduce or stop debt servicing is likely to yield better results if seen as a step toward reaching a consensual and definitive deal with creditors. Such a tactic is also more effective if accompanied by a coherent macroeconomic program and a conciliatory attitude toward creditors.² Costa Rica skillfully met these preconditions. It should also be mentioned that at the time of the deal, Costa Rica had certain geo-political features that made the US government wish to maintain friendly relations.

NON-BRADY DEALS

Outside of the Brady packages, more traditional rescheduling of commercial debt slowed down. Chile's rescheduling of its debt in September 1990 was an important exception. Chile's recent economic evolution influenced its unique approach to debt rescheduling. For several years, it has pursued prudent macroeconomic policies. It has had dynamic growth in exports since 1985 and, even before the Brady Initiative was announced, it had drastically reduced its debts to commercial banks.

Chile's deal was special in that it did not include debt and/or debt service relief. It also introduced a different mechanism to raise "new money." Instead of obtaining money from existing bank creditors, Chile placed bonds among a small number of banks that had a long-term commitment to fund the country. This move represented an

important step in Chile's return to the international capital market.

Chile's debt deal, like those of Mexico and Venezuela, helped trigger important private flows of capital into the country. Indeed, Chile and Mexico attracted the most investment in stocks and shares of any countries in the region. Chile is the first country in Latin America to have acquired, through its sound economic policies, a completely voluntary bank credit since 1982. Banks are willing to invest in Chile voluntarily, without coercion from the International Monetary Fund (IMF) — a signal of the country's return to creditworthiness. Chile's progress in overcoming its debt crisis can also be measured by its economy's recent ability to grow at a fairly rapid pace. Preliminary figures show that Chile's GDP grew 5.5% in 1991.

Chile, Costa Rica, Mexico, and Venezuela all followed prudent macroeconomic policies and handled their external debt problems with relative clarity and consistency. Ultimately, however, their experiences show that there is no single optimum way to restore creditworthiness and boost economic growth. A country's particular circumstances must determine its strategy.

There are other countries in Latin America, like Brazil, that are still in arrears to commercial banks. At the time of writing, Brazil had serious macroeconomic imbalances and it had not yet reached an agreement with its creditor banks on debt repayment, although Brady Plan negotiations were ongoing. Even if Brazil were to reach an agreement similar to the Mexican deal, it is not clear whether it would be sufficient to restore creditworthiness and spur growth. Parallel efforts to reduce macroeconomic imbalances would also be required. It is encouraging, however, that in spite of these difficulties, private capital flows to Brazil increased in 1991.

UNCERTAIN FUTURE

Two issues remain outstanding. Will the debt management deals reached in the last three years in Latin America generate sustained economic growth and a return to creditworthiness? Although there are grounds for optimism, it's still uncertain whether the

A STUDY OF CAPITAL FLOWS

IDRC has initiated a project to study the resumption of major private capital flows to some countries in Latin America. The project will examine the composition, source, financial conditions, and destinations of these flows and the domestic and international policy conditions to which they respond. By using Latin American case studies, the project will also evaluate the contribution of such flows to a country's growth and development as well as potential problematic effects, such as excessive foreign exchange obligations and distortions of economic policy. Project results will include recommendations to both developed and Latin American governments on how to encourage private capital flows and how to regulate them when necessary.

positive trends emerging for countries like Chile, Mexico, and Venezuela will continue and come to be shared by other debtors. The case of the relatively smaller Latin American debtors, except for Bolivia and Costa Rica whose debt problems are of a manageable size, causes even greater concern. Smaller countries "don't matter" to the banks, leaving little incentive for deals that would reduce these countries' debt. Their governments will have to struggle along in partial arrears and with little access to new sources of private capital. Even if these countries do reach an agreement with the commercial banks, they might still not attract new money.

Several Latin American countries, especially small ones, also have very heavy debts owing to bilateral and multilateral sources. Some progress has been made in the relief of official bilateral debt in that the Paris Club has granted more generous terms to severely indebted lower middle-income countries, like El Salvador and Honduras, since September 1990. (The

Paris Club, an international committee of 13 industrialized countries, meets periodically to negotiate international financial agreements with indebted countries.) Like all Paris Club agreements for lower middle-income and low-income countries, there is a clause for debt reduction through debt/equity swaps and/or debt for nature or development. These swaps involve third parties that will pay off part of a country's loan in exchange for stock or industrial investments, nature reserve acreage, or development privileges.

Egypt and Poland, two middle-income countries, have received far more significant reductions in official bilateral debt than countries in Latin America. When fully implemented, these agreements — reached in 1991 — will achieve the equivalent of a 50% reduction in the present value of scheduled debt service payments for bilateral debt. Although creditor country officials have formally stated that Egypt and Poland are special and exceptional cases, informally, they recognize that these deals have broken new ground. In cases where debt reduction is a prerequisite for growth in lower-middle income countries, the Egyptian and Polish deals may set a precedent for more generous terms.

MORE HELP NEEDED

There has been good progress toward resolving the debt crisis in Latin America, although continued assistance is needed to help the region's economies grow and return to creditworthiness. It is important that such institutions as the IMF, the World Bank, and the Inter-American Development Bank support debtor countries in their negotiations with creditor banks. This would help ensure that deals having sufficient debt reductions are speedily finalized. Such support is particularly critical for small debtors.

Multilateral institutions, along with creditor governments, can also help to improve Latin America's access to different sources of capital. For example, bank regulators in creditor countries remove those countries that are seen to have overcome their debt problems from the "debt rescheduling list." New money is therefore no longer penalized by automatic loan-loss provisions.

An encouraging step in this direction is the American bank regulators' removal of Chile in early 1991 from the list of debt rescheduling countries. Similarly, for those countries emerging from debt problems, it would seem desirable to reduce the capital requirement linked to new loans. Currently, 100% of the capital must be put up as collateral for loans to the least developed countries. This obviously discourages new lending.

The new private capital flows need more than mere encouragement by industrial and recipient governments. The nature and scale of the flows must be monitored and evaluated. Moreover, government action must be possible to stimulate such flows where they are insufficient and to regulate them and their effects when and if they become excessive. Governments in both Latin America and the industrialized world should carry out such regulatory actions.

OFFICIAL DEBT REDUCTION

The official bilateral debt of severely indebted countries must be reduced. Creditor governments could help these countries ease their debt burden by launching initiatives similar to the US Enterprise for the Americas, which allows the substantial reduction and restructuring of US concessional loans to Latin American countries. More effort should also be directed toward helping lower-middle income countries with large bilateral debts to take advantage of the clause in Paris Club deals that allows up to 10% of bilateral official debt to be reduced if used for debt-equity, debt-for-nature, or debt-for-development swaps.

SIGNS OF OPTIMISM

Efforts to alleviate the debt crisis in several Latin American countries have advanced significantly over the last two years. Positive indirect effects have begun to materialize for countries that have reached debt deals. Although voluntary bank lending to the region has not returned, other private flows of capital have grown substantially since 1990. For larger countries, such as Chile, Mexico, and Venezuela, prospects for growth have improved. The future economic health of Brazil and Argentina is more uncer-

tain but still promising, especially at the level of reaching debt deals and attracting new money from private sources. For most of the heavily indebted small countries, however, debt reduction is moving slowly and efforts are required to accelerate its progress.

Dr Stephany Griffith-Jones with Ricardo Gottschalk.

This article draws on a study prepared for the United Nations Economic Commission for Latin America and The Caribbean and on a study being prepared for IDRC with Dr Roy Culpeper of the North-South Institute.

REFERENCES

1. For a description of how time-consuming, distracting, and costly Costa Rica's debt negotiations were, see Rodriguez, E. 1988. "Costa Rica: A Quest for Survival" in S. Griffith-Jones (ed), in *Managing World Debt*. Harvester-Wheatsheaf, Hemel Hempstead, U.K. pg. 193-210. This study was funded in part by IDRC.
2. Devlin, R. and M. Guerguil. April 1991. "America Latina y las nuevas corrientes financieras y comerciales" in *Revista de la CEPAL*, 43, pg. 23-50. See S. Griffith-Jones (ed), op. cit.



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NIGERIA: A PROFILE OF DEBT

With its reserves of oil and its population of 90 million, Nigeria is one of sub-Saharan Africa's largest economies. It is also one of the most indebted countries in the world.

Its debt rose from US\$567 million in 1970 to \$36.1 billion in 1990. This latter figure represented 22% of the total amount of money owed that year by countries classified as "severely indebted."

In the 1970s, resource-rich Nigeria was seen as a nation with a promising future. The 1980s, however, proved to be a lost decade — as it was for so many African countries. Nigeria's regression from hope to hopelessness reflects how even a well-endowed

economy can suffer from massive debts.

REASONS FOR CRISIS

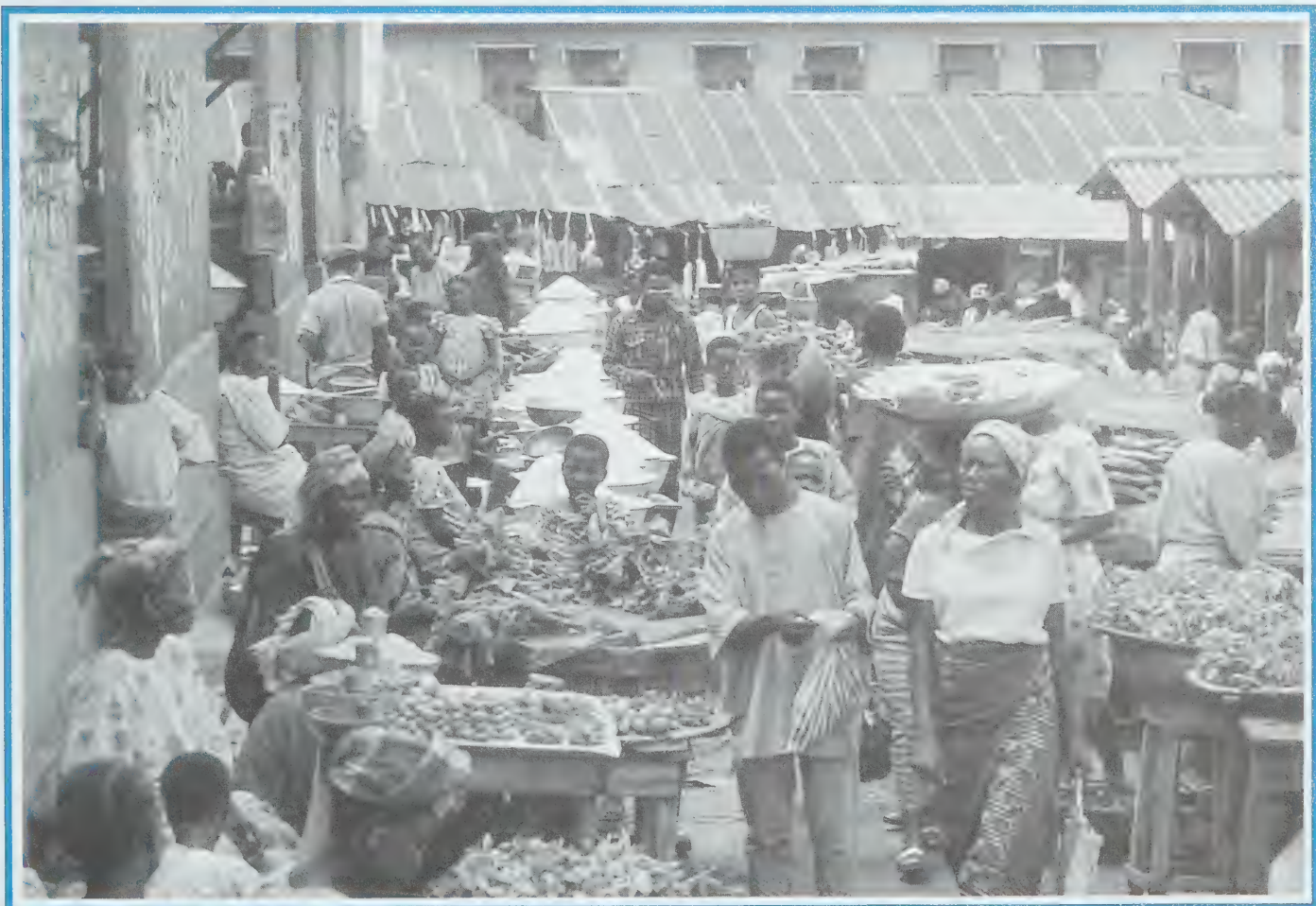
Both domestic and external factors are responsible for Nigeria's debt crisis. The external factors include oil price shocks, a decline in terms of trade, global recession, the liberal lending policies of international commercial banks, and rising interest rates.

During the oil boom of the early 1970s, Nigeria enjoyed healthy revenues. Public spending increased. The government's credit rating was very high and it was able to borrow heavily from international lenders who were busily recycling petro-dollars. When the price of oil dropped in 1978, the government saw it only as a temporary event and did not reduce expenditures. Instead, it made every attempt to hold spending to its oil-boom level,

despite falling revenues. The global recession of 1979 to 1982 caused a further decline in export earnings. Nigeria was forced to borrow even more money to make up for these losses and to meet increasing requirements for imports. The subsequent rise in interest rates in the 1980s hit Nigeria particularly hard since the government had acquired substantial loans from private sources (meaning commercial banks) at market rates. In 1970–72, Nigeria's loans from these creditors amounted to about 31% of its total debt. Ten years later, this figure had increased to about 85%.

BAD POLICIES

Domestic factors worsened these problems. The government followed inappropriate macroeconomic policies, which included the overvaluing of exchange rates, the accumulation of



A fair price for consumers: adjustment with a humane face is necessary to eliminate inefficiencies .

large fiscal deficits, and excessive monetary expansion. Poor trade policies resulted in a lack of growth in the export sector. Nigeria also embarked on several projects of doubtful viability that generated little income with which to pay off external loans.

Finally, government policy inherently discouraged savings. Negative real interest rates led to money flowing out of the country. The negative rates also encouraged the build-up of even greater debt; external financing was needed to bridge the gap between domestic savings (which generally serve as a supply of capital) and required investment in the economy. By 1990, Nigeria's debt amounted to 133% of its gross national product.

ADJUSTMENT PROBLEMS

Recent efforts to resolve the debt crisis in developing countries have rested on three major pillars. The first is the adoption of a macroeconomic adjustment program. This is designed to encourage the efficient use of resources in order to spur economic growth. The second recognizes that debt should be treated on a case by case basis, i.e., a country's specific circumstances must be considered. Finally, debt cannot be controlled unless a country continues to receive external resources. Unfortunately, the focus has tended to be on domestic reforms with less attention to the need for external financing.

By 1986, Nigeria's economy had deteriorated to the point where it had to negotiate a rescheduling of its debts. Before creditors agreed to such a rescheduling, Nigeria had to adopt a structural adjustment program approved by the International Monetary Fund. Between 1986 and 1991, Nigeria has had three debt relief agreements with multi-lateral creditors, totalling about US\$14.6 billion.

One of the principal goals of Nigeria's debt strategy was to achieve external viability. This is defined as being able to meet financial obligations without having

to reschedule debts and, at the same, realize satisfactory economic growth.

In the short-run, this goal has not been met. Indeed, the belt-tightening involved in the process of structural adjustment has made life a lot worse for many Nigerians. Unemployment is high. The revenue base is not rising and basic services, such as health and education, are insufficiently funded because the government must first satisfy external debt obligations. Unstable and high interest rates, along with a government budget deficit, have led to spiraling inflation. The country's inflation rate, which was 10% in 1986-87, rose to 38% in 1987-88 and to 50% in the following year. The increase in inflation has driven real incomes down drastically.

THREE KEY ISSUES

The short-term rescheduling of debt may solve immediate difficulties of liquidity. But it does not address the root of the problem and only defers "evil days." The solution to Nigeria's debt crisis (and those of other countries) is complex and involves a strong commitment at both domestic and international levels. Three issues are of primary importance.

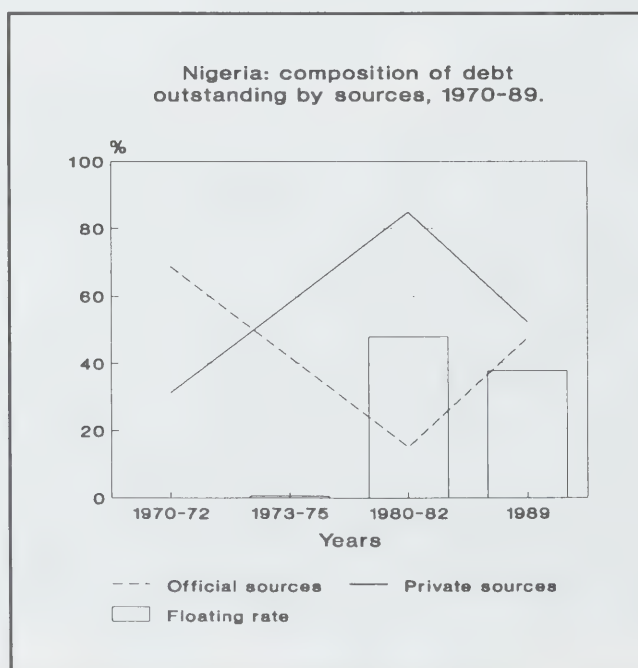
A favourable international economic environment must be created that allows for the maintenance of an open

trading system, the removal of artificial barriers, and the reduction of interest rates on debt. Export promotion policies are only useful if there is access to markets. With the emergence of regional trading blocks, Nigeria (like other African countries) needs to develop new skills in the export sector and to create a niche for itself in an increasingly competitive international environment.

Creditor nations must give more attention to the issue of larger debt reduction and lengthened periods of rescheduling. There has been much discussion on the economic plight of developing countries and the need for them to grow out of debt. If the industrial world is genuinely concerned, it is now time to move beyond rhetoric and take positive action. The present level of debt must be substantially reduced and the rest rescheduled with reduced interest rates, elongated terms of repayment, and favourable periods of grace.

Finally, adjustment is necessary, albeit with a humane face. It should reduce distortion and eliminate inefficiencies in the economy while allowing for sustained growth. Such adjustment, preferably home-grown, should be geared toward both domestic and external viability. Perhaps then the state of economic hopelessness in which many African nations founder will evolve into one of optimism for the future.

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LENDERS OF LAST RESORT

Developing-country debt doubled between 1980 and 1991, reaching a mind-boggling US\$1.3 trillion. Three groups of creditors hold the purse strings: private lenders, mainly commercial banks; bilateral agencies under the control of governments of the industrialized world; and multilateral organizations such as the International Monetary Fund (IMF) and various multilateral development banks.

The debt holdings of all three groups of creditors grew throughout the 1980s — private debt rose by 77% and bilateral debt by 184%. But multilateral debt has seen the most startling increase at 319%. Moreover, it shows no signs of slowing down, unlike private debt which has fallen by about

\$47 billion since 1987. Bilateral debt also appeared to peak in 1990.¹

These developments are related to the various international initiatives introduced to manage the debt crisis since 1982. These include strategies to restructure and reduce commercial bank debt and other efforts to reduce bilateral debt for the poorest countries. Multilateral agencies have consequently become “lenders of last resort,” taking the place of retreating commercial and official bilateral lenders, and in some cases underwriting their withdrawal.

BRADY PLAN DEALS

The Brady Plan was one of the vehicles by which commercial debt was replaced by multilateral debt. Launched in 1989 by the new US Treasury Secretary, Nicholas Brady, the plan aimed to reduce the amount of money owed by developing countries to commercial banks. What this meant in practice was that the World Bank and IMF had to put up guarantees which could be called by the com-

mercial banks if the debtor countries failed to honour their reduced debts. The two multilateral institutions earmarked US\$25 billion for this purpose. In 1990 and 1991, the World Bank and IMF each committed more than \$2.7 billion to support “Brady debt deals” for Mexico, the Philippines, Uruguay, and Venezuela.² In effect, commercial bank debt reduction was purchased at the cost of increases in multilateral debt. For example, in the Mexican package a US\$12.7 billion reduction in bank debt required \$5.8 billion in additional financing — \$3.7 billion of this came from the World Bank and the IMF.

It would be misleading, however, to suggest that the transformation of private debt into multilateral debt can be solely attributed to the Brady Plan and its predecessor, the Baker Plan. (The latter, introduced in 1985 by then US Treasury Secretary James Baker, exhorted banks and agencies to loan new money to developing countries so as to fuel economic growth.) More accurately, private creditors ceased to



A reduction in the interest rates for severely indebted countries like Guyana would not hurt the net income of the multilateral development banks.

lend to much of the Third World in the latter half of the 1980s. Banks liquidated their claims as they were amortized or sold their loans at discounts. This left official creditors, particularly the multilaterals, as the only creditors willing to continue lending to Latin America and Africa.

DEBT RISES

In its 1991 annual survey of developing-country debt, the OECD noted the marked rise in reported amounts of multilateral debt and debt servicing. Developing countries had to pay US\$32 billion to service their debts in 1990. Close to one-third of this amount went to the IMF.

The growing indebtedness to multilaterals is a multifaceted problem. The practice until now has been that multilateral debt cannot be rescheduled, making it more rigid than other forms of debt. Countries falling behind in their payments can be ostracized from the world financial system. Moreover, because of this rigidity, many borrowers are paying out more in debt servicing than they are receiving in new loans. In effect, debtor countries are transferring resources to multilateral agencies, in spite of increased lending. Since 1985, the multilaterals themselves have contributed to this negative net transfer, owing to the short-term nature of the IMF's credit facilities and heavy repayments on non-concessional loans. (Non-concessional loans are those given at market rates. They represent about 70% of multilateral lending. Concessional loans carry more favourable terms.)

MONEY FLOWS TO IMF

The magnitude of negative net transfers to the IMF is particularly striking, especially from 1985 to 1991. During the height of the debt crisis, the multi-

laterals became a destination rather than a source of money. Developing countries paid US\$6.1 billion more to the IMF in debt payments and servicing than they received in financing from the multilateral banks. Regionally, IMF net transfers to sub-Saharan Africa turned negative in 1984, reached a peak of -\$954 million in 1986, and totaled -\$4.0 billion over the period 1984-90.³ In the Latin American/Caribbean region, Fund transfers turned negative only in 1986 but amounted to -\$9.6 billion over 1986-91.⁴

No borrower, however, can expect to receive positive net transfers forever. Moreover, borrowed money properly invested should generate a stream of earnings to help service a country's debt. Still, countries having difficulties meeting their debt obligations have found their problems compounded when multilateral creditors are on balance demanding payment rather than providing finance.

The problem of developing-country indebtedness to the multilateral agencies clearly revolves around the IMF. Since the IMF is a fundamentally different kind of "creditor" agency than the multilateral banks, the solutions must also be different. The IMF's function and financial structure as a short-term revolving fund means that any rescheduling of its credits might quickly compromise its integrity. That is why the Fund moved with such speed to establish the US\$8.4 billion Enhanced Structural Adjustment Facility (ESAF) in 1987-88. ESAF's creation marked the first time that industrial countries channeled official development assistance through the IMF. Through ESAF, low-income borrowers could refinance their Fund credits on easier terms. Regrettably, the IMF imposed tough terms of conditionality on would-be

borrowers, thereby limiting the use of ESAF resources.

SELL RESERVES

Some experts have called for the sale of a portion of the IMF's gold reserves — worth some US\$40 billion on the open market — to help ease the burden of countries indebted to the Fund. Proceeds from the sale could be used to refinance the obligations of low-income members to the Fund on highly favourable terms.⁵ Such a proposal would, however, broaden the IMF's toe-hold in the area of concessional lending. Some might argue that the Fund should stay away from concessional lending, leaving it instead to agencies whose main purpose is development assistance, such as the World Bank or bilateral aid agencies. As an institution geared principally to assist countries with short-term balance of payments difficulties, the IMF seems out of place in countries with deep structural problems.

Meanwhile, the IMF is in the midst of a 50% expansion of its lending capacity, brought on by the admission to the Fund of the republics of the former Soviet Union. It is questionable whether the economic plight of these new member countries, or of the Eastern European countries that have also joined the IMF, will be any more temporary than that of African nations. It would not be surprising if a few years from now, these new members face debt servicing difficulties with a perverse net transfer relationship with the IMF.

IMF'S ROLE QUESTIONED

On the eve of a major new expansion in IMF lending, it seems appropriate to question the future role of this organization, especially with regard to developing countries and other borrowers facing long-term structural problems. Perhaps it is time, if not to merge the IMF with the World Bank altogether, then to dovetail its lending facilities for developing countries with those of the Bank. Repayments to the IMF would then be anticipated in advance and funded through longer-term Bank loans, instead of being added to a mounting and unserviceable debt to the IMF.

Percentage of Multilateral Debt in Total Debt Service of Developing Countries.

	1982	1987	1990
All developing countries	6	21	20
Sub-Saharan Africa	13	30	28
Asian low-income countries	12	27	22

Source: OECD.

As to the multilateral banks themselves, a distinction must be made between their concessional and non-concessional windows. Concessional loans, provided by such agencies as the World Bank's International Development Association, have maturities of up to 50 years at zero or very low interest rates. These soft loans are funded through contributions from donor countries. In contrast, the "hard" windows typically provide 20-year loans at market-value rates. The multilateral development banks fund these loans by borrowing on the capital markets. These non-concessional loans are problematic. For the debtor countries, they cause negative net transfers. For the multilateral development banks, they force a hard-line stance on lending. The banks insist that borrowing countries must service their debts promptly and in full, otherwise the terms on which the banks can borrow on the capital markets would be jeopardized.

Like the IMF, the World Bank has sought to refinance the hardest of its loans with softer funding. In 1989 the Bank introduced a program to help low-income, debt-distressed borrowers. Through allocating US\$300 million in concessional "supplemental credits" from the International Development Associations, the World Bank subsidized payments on the non-concessional loans. Some bilateral donors have contributed to this program.⁶

DEBT RELIEF

Such measures are likely to become more popular over the coming years.⁷ But they come at a cost, ultimately diverting aid resources from low-income recipients. What are the alternatives? An obvious answer is to consider the possibility of debt rescheduling by the multilateral development banks. The banks' income would not be affected if debt-strapped countries were given more time to pay off the principal of their outstanding loans. One expert calculated that, if the World Bank had rescheduled its loans to Latin American countries by extending the terms of repayment, the relief would have been the same in 1991 as that provided by an additional US\$3.1 billion in loans to the region.⁸

It may be possible to go even further. In 1990, the multilateral development banks collectively earned a profit of more than \$2 billion, one-half of which went to the World Bank. The banks' income in the past few years has been of similar magnitude. Although the profits of the World Bank group have not grown at the same rate as its lending, its rate of return on assets has been in the range of 1 to 2%. (This indicates a return of about 12 to 24% on capital.) The returns of the other multilateral development banks have tended to be higher — for example, the return on assets in the Asian Development Bank in 1990 was more than 4%. These figures compare favourably with profits enjoyed by successful commercial banks.

ABSORB LOSSES

Thus, there may be some leeway for the multilateral development banks to reduce interest rates without hurting their net income. For example, interest-rate relief could be confined to those severely-indebted low-income countries that owe more than 40% of their debt to the multilateral agencies (including the IMF). In 1988, such criteria would have made Burundi, Guinea-Bissau, Guyana, Honduras, Kenya, Malawi, and Uganda eligible for relief. Outstanding non-concessional loans to these countries amounted to US\$2.6 billion, or about 2.2% of all such loans outstanding to the multilateral development banks.⁹ Even if the interest on these loans were entirely forgiven, the multilateral development banks would only lose about \$50 million in income, an amount that could easily be absorbed. It is doubtful that such measures would cause the bond rating agencies much concern — the reason given by the banks for their unwillingness to contemplate any departures from full and regular servicing of their loans. Indeed, underwriters might see such measures as strengthening the banks' loan portfolio and preferable to the conventional measure of refinancing unsustainable debts.¹⁰

To end on an optimistic note, it is encouraging that much of the developing world is beginning to emerge from the debt crisis of the 1980s. Unfortunately, the resumption of economic

growth is confined more to middle-income countries than to the poorest countries of the developing world. While debt relief is no panacea for any country's economic problems, it can help to reduce the tremendous external financial pressures faced by debtor countries.

The IMF and the multilateral banks have a particular responsibility to help solve the problem of debt, especially as it affects the poorest countries. It is both timely and feasible to contemplate measures to alleviate the debt burden, to the benefit of both the debtor countries and the multilateral agencies themselves.

REFERENCES

1. World Bank (1989, 1990 and 1991). *World Debt Tables, 1989-90, 1990-91 and 1991-92*, vol. 1. Analysis and Summary Tables (Washington, DC).
2. World Bank (1989, 1990 and 1991), pg. 68.
3. Helleiner, G.K. (1991), *The IMF, the World Bank, and Africa's Adjustment and External Debt Problems: An Unofficial View* (manuscript, February 1991).
4. World Bank (1989, 1990 and 1991)
5. Helleiner, G.K. (1991), pg. 32.
6. World Bank 1990 (1989, 1990 and 1991), pg. 28.
7. Feinberg, Richard E., Eduardo Fernandez-Arias and Frank Sader (1992), *Debt Reductions and North-South Resource Transfers to the Year 2000* (Washington, DC: ODC Policy Essay No.3, pg. 30) predict an increase in the MDBs' share of the stock of debt from 20 percent in 1991 to 28 percent in 2000.
8. Feinberg, Richard, *Debt and Transfiguration? Prospects for Latin America's Economic Revival* in Felix, David, ed. (1990) (Armonk, N.Y.: M.E. Sharpe, pg. 227-32).
9. From calculations undertaken by the author with the assistance of Andrew Clark.
10. Culpeper, Roy (1991), *Growth and Adjustment in Smaller Highly Indebted Countries: An Overview*. North-South Institute, Ottawa. p. 38.



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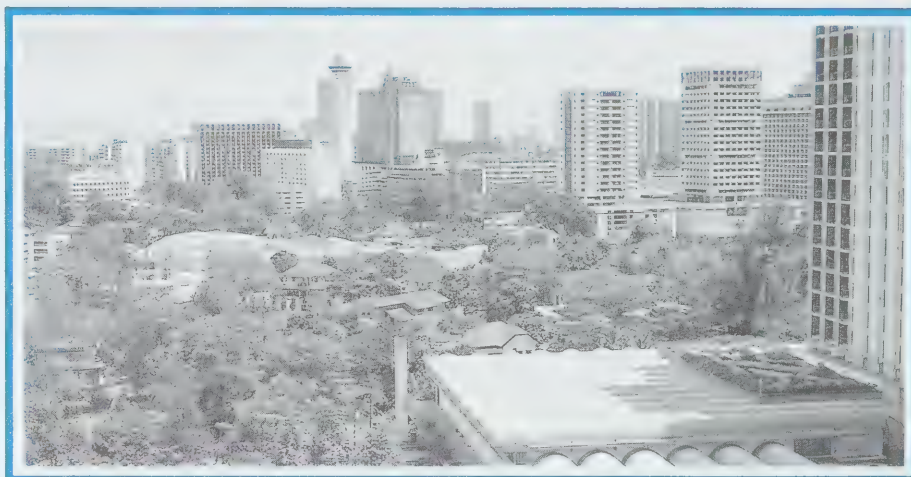
THE STATUS OF SAVING

National savings rates have been declining for several years in many countries of the industrial and developing world. Given the importance of saving to the global economy, this trend is causing much concern.

Saving is critical to maintain growth and to help solve the problem of international debt. Declining saving rates have been associated with lower rates of capital accumulation and slower growth in the global economy. Moreover, differing rates of saving among countries have contributed to the emergence of large trade imbalances.

Most economists agree that if these long-run trends continue, they would have a serious impact on international economic growth. Yet attention has recently shifted to the potential consequences of a more immediate threat — that of a short-run global capital shortage. There are claims that this is caused by increased demands on global financial resources resulting from such events as the process of transition in Eastern Europe and the former Soviet Union, German unification, reconstruction of the Middle East, disaster relief, and structural support of countries in debt. At the same time, large private and public sector deficits persist in important industrial countries. Even countries like Germany and Japan are experiencing a decline in their traditional surpluses of capital because of structural changes in their economies.

These factors mean that world capital markets are likely to become increasingly competitive. Countries needing capital in both North and South may face scarcer supplies of funds. Can the perceived shortage of global savings be avoided? Do the world's financial markets have the capacity to absorb additional demands for funds? Can structural changes in the global economy take place in a way that does not jeopardize growth? Or, will a savings shortage perpetuate high interest rates (or even increase them) and limit economic growth?



Newly industrializing countries in Asia such as Singapore are providing much of the capital needed by the world's markets.

TRENDS IN SAVING

Global savings and investment are notoriously difficult to measure. The latest reliable estimate puts total world saving at approximately US\$4.2 trillion in 1989. On a global scale, both saving and investment have declined as a percentage of the gross national product (GNP) since the early 1970s.

Since the mid-1970s, the OECD countries have become net importers of capital. All over the world, and particularly in North America and a few other industrial countries, government debt generates a demand for money. OPEC countries provided most of the financial resources needed by world markets during the 1970s. But since the downturn in oil prices hit the OPEC region in 1983, newly industrializing countries in Asia (and particularly Taiwan) have largely taken over this role. By the end of the 1980s, they had provided up to 10% of their GNP to international capital markets. Within the industrial world, North America emerged as the largest capital importer, while Japan — at least during the 1980s — provided substantial excess savings to the world.

About 80% of total private saving is accumulated in the industrial world. In the developing world, Africa has consistently suffered from insufficient saving, although the situation has improved slightly during the 1980s. More recently, Asian and Latin Ameri-

can countries have become excess savers.

GLOBAL BALANCE

For an individual country, or even a region, imbalances between savings and investment are not necessarily critical. A country can invest more than it saves and borrow what it needs on capital markets. Countries that are excess savers supply the necessary funds. On a global scale, however, the supply of savings must equal the demand for investment. In other words, one country's investment must be another country's savings.

But the global balance between *planned* saving and *desired* investment can be lopsided. For example, greater demands for investment will trigger processes of adjustment; either the price of borrowing capital will rise (i.e. higher interest rates) or certain investment projects will not be funded. Capital shortages largely affect world markets through higher interest rates. Indeed, world interest rates did rise during the late 1970s and the 1980s. The 1980s have in fact been quite atypical, in that real (meaning corrected for inflation) interest rates have persisted at unprecedented levels, possibly as a result of greater demands on world financial markets. Competing economic theories have identified a number of potential culprits for this enduring increase. An insufficient amount of savings (either

current or expected) is only one of many hypotheses explaining the rise in real interest rates.

REDUCED DEMAND

The unification of Germany, the transitional economies of Eastern Europe and the Commonwealth of Independent States, reconstruction of the Middle East, and new lending to developing countries account for about a 3% increase in demand for world savings. There are, however, trends in other areas that appear to signal a reduced need for funds. For example, investment has slowed in the previously booming commercial real estate market in the United States and elsewhere. Moreover, there are indications that the rates of fixed investment in Japan during the late 1980s are not likely to be sustained.

The possibility also exists for more savings in the public sector in industrial countries. These range from prospects for tax increases in Germany to massive reductions in military expenditures, particularly in the US. The rapid advancement of European integration is likely to lead to improved fiscal discipline and consolidated budgets, and thus reduced public sector spending. At any rate, government deficits are still critical and reducing them will be important for future national saving in industrial countries.

Private saving behaviour is difficult to project in that it reflects a society's values and changing preferences. The latest medium-term International Monetary Fund forecast, however, shows that private savings in industrial countries will drop by about 0.5% of GNP, primarily because of a rapidly aging population and the corresponding increase in the ratio of dependents to wage earners in Japan and many European countries.

Although world saving might be insufficient over the short- and medium-term, it is also evident that even small changes in the current economic environment and in public and private sector behaviour could generate enough funds to eliminate the problem entirely. A first conclusion is, therefore, that forecasts of a major saving gap or an imminent capital shortfall should be treated with some scepticism. Consequently, concerns

that insufficient saving will lead to increases in world real interest rates are also mostly unwarranted.

CREDIT SQUEEZE

Claims on world financial resources are likely to squeeze the amount of capital available from multilateral development banks and bilateral institutions to many small developing countries. This rationing of financial support may be as important for this group of countries as the potential eroding of the favourable terms of international lending. Small adjustments to the level of support can translate into significant setbacks for the most vulnerable countries. Any globally co-ordinated scheme to give financial aid to selected regions must include safeguards so that the smallest, least developed, and highly indebted countries still have access to the finite sources of capital available to international agencies.

Why should individual countries be concerned about the global supply of funds, when, in the long run, growth for any country is financed out of domestic saving? There is little evidence to suggest that the degree of access to external funds affects medium-term growth rates in developing countries. In fact, during the last two decades, economic growth was generally lower in the developing countries that borrowed than in those that did not. This was largely due to the high interest rates of the 1980s suffered by severely indebted countries. Even earlier, however, borrowers' growth rates were only marginally higher than those of non-borrowers. Although the borrowed funds helped boost per-capita income, it is less likely that they stimulated the economies of the recipient countries. Differences in the developing countries' growth have largely been the result of differences in their rates of domestic saving. From this perspective, national saving should be encouraged.

FEARS UNFOUNDED

A tentative conclusion is that fears of a global capital shortage, skyrocketing real interest rates, and negative effects resulting from greater demands on international financial resources over the next few years are most likely

unfounded. There appear to be as many trends pointing toward increases in saving as there are indications of additional capital needs. Also, even if substantial savings shortfalls were to materialize, the limited rise in real interest rates would have relatively benign effects on countries of both North and South. The only major caveat relates to small developing countries that have in the past depended upon favourable terms of lending from multi- and bilateral institutions. This includes countries like Burundi, which owes 73% of its debt to multilateral sources. If international capital shortages translate into even the smallest encroachment on the allocation of funds to these countries, their medium-term development could be threatened. In addition, the debt burdens of many developing countries suggest that in the long-run, external sources of funds cannot substitute for sufficient national saving. If domestic saving corresponds to development needs in the South, developing countries should not suffer as a result of increased competition for international capital.

Finally, while the short-term fears of a global capital shortage are clearly unwarranted, concerns about the medium-term trends in world saving are not. National saving rates must be raised substantially throughout the world to allow real interest rates to decline to the post-war average of 1 to 1.5%. That, more than anything else, will contribute to a stable expansion of the global economy.



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HELP FROM ABOVE

With an exchange of greetings by satellite, Queen Elizabeth II of England and President Frederick Chiluba of Zambia officially inaugurated an experiment in communications that could revolutionize health care in Africa.

The project, called HealthNet, is an innovative use of satellite technology that will transmit medical information and enable physicians to communicate with their colleagues throughout the world. "If there were such a return on all investment in education, the world would know less suffering," said President Chiluba in his message to the Queen earlier this year.

HealthNet was begun by SatelLife, an international, non-profit organization based in Cambridge, Massachusetts that aims to address health information and communication needs in the developing world. SatelLife chose to use low-earth orbit satellite technology to accomplish its goals.

IDRC is collaborating with SatelLife on the HealthNet project. This is a natural partnership; IDRC has been promoting the use of this technology since the early 1980s because of its interest in exploring the potential use of satellites to improve communication to and from the developing world.

Built by Surrey Satellite Technology Ltd. at the University of Surrey in the UK, the HealthNet satellite is designed to transmit information to and receive messages from ground stations based at medical institutions in Africa and other regions of the world.

BENEFITS AFRICA

Africa, with its severe communication problems, stands to benefit most from HealthNet's technology. Expensive and unreliable phone systems, non-existent transmission lines, and costly medical literature make it hard for African physicians to keep abreast of recent medical developments and communicate with other health professionals.

Examples of communication difficulties abound. There are more tele-

phones in Manhattan than on the entire continent of Africa. Once, a disease control officer in Zimbabwe tried to telephone his counterpart in Mozambique about an outbreak of cholera on the border. He could not, however, get through. Cost is another barrier to communication — professors at the University of Zambia have to pay about one-tenth of their monthly salaries to send a one-page fax to Europe.

Africa also suffers from a dearth of medical information. Financial constraints have forced medical libraries to cut their journal subscriptions; in

some cases, the most recent acquisitions date back to the 1970s. In Uganda, where AIDS is a major health concern, current information on the virus is scarce. The first journal article on AIDS was published in 1981 and Makerere University, once considered the jewel of African medical institutions, has not been able to pay for a periodical since 1980. "Here's a country being ravaged by an epidemic and they cannot afford the literature describing it," says Dr Charles Clements, Executive Director of SatelLife.

This poverty of information has compromised health care in Africa —



HealthNet's satellite is checked out prior to launching.

planning is done without sufficient facts, decisions are based on outdated information, and research is in danger of being irrelevant or unnecessary. "If you can't communicate and if you don't have access to information, you can't change anything — you're working on an island," says David Balson, a Senior Program Officer with IDRC's Information Sciences and Systems Division. "HealthNet will contribute to ensuring that a person's geographic location is not a handicap."

The satellite that can transcend national boundaries is no bigger than a beach ball. It revolves around the earth in a 800-km orbit 14 times each day, sending out a continuous signal that is picked up by a modified amateur (HAM) radio attached to a personal computer. Once the signal is recognized, a message transfer takes place between the satellite and the ground station. When in range of a ground station, the satellite can transmit about 30 pages a minute. SatelLife is exploring the possibility of acquiring space on a second satellite in 1993 in order to provide greater capacity and to provide alternative channels in case of failures.

LICENCES ISSUED

In Africa, ground stations have been licenced in Congo, Ghana, Kenya, Mozambique, Tanzania, Uganda, and Zambia. They are operating in all these countries, with the exception of Ghana where a station is in the process of being established. In total, 15 African countries are expected to participate in the project being funded by IDRC. Canada has also issued an experimental licence for HealthNet's operation to Memorial University in St. John's, Newfoundland. Memorial, with its expertise in telecommunications, will act as a North American "gateway" for the project. Messages that originate in North America will be sent to the university via conventional electronic mail for transfer to the satellite. Surrey Satellite Technology Ltd. in the UK will provide the same function for Europe.

Initially, there was a risk that some countries might be reluctant to grant licences because of concerns over security and potential loss of telecommunications revenue. Telecommunications authorities, however, can

monitor all traffic on the system if required. The system's capacity is also relatively small so it does not compete with the large telecommunications networks in Africa. Moreover, HealthNet provides an important health service that contributes to a country's development. "We have not been turned down anywhere (for a licence)," says Julia Royall, SatelLife's Deputy Director. "Our mission is convincing and we are not an active challenge to revenue or security."

ELECTRONIC NEWS

Regular satellite transmissions have begun, along with ongoing training of ground station staff. The first issue of *HealthNet News* was issued by satellite in March 1992, the occasion marked by the exchange of messages between Queen Elizabeth and President Chiluba. *HealthNet News* is an electronic newsletter featuring summaries, abstracts, and articles with current medical information. *The New England Journal of Medicine* is allowing the use of its articles for the project and other journals are expected to follow suit. Ground stations will also be equipped with CD-ROM players and disks, giving users access to journals and databases independent of the satellite system.

A second feature of the satellite's health information service is the library partnership program. Medical libraries in Africa are being twinned with other libraries throughout the world to facilitate the exchange of information. The University of Florida Health Science Library is already paired with the medical library at the University of Zambia. The Oswaldo Cruz Institute in Brazil is serving as a resource for the medical library in Mozambique.

Doctors will also be able to get advice on particular cases and problems via the satellite. The Massachusetts General Hospital and the Harvard School of Public Health are interested in providing clinical and public health consultation to HealthNet users in the South.

Perhaps the most important application of the satellite, however, is that it enables medical professionals in Africa to communicate with their colleagues. Information sharing will be possible

on a global scale whereas before, it was difficult to get a message from one regional district to another. Physicians in Mozambique have used HealthNet to establish electronic links with their counterparts in Zambia to compare notes about diseases that are as yet undocumented in African medical literature.

EXPENSIVE PROJECT

Such a far-reaching project requires a big budget. SatelLife raised approximately US\$1.5 million last year for HealthNet through contributions from agencies, foundations, corporations, and individuals and from the sale of communications capacity on the satellite. The project is studying other ways to generate revenue so that the system can be sustained on a long-term basis and at minimal cost to developing countries. For example, users in the North could be charged a reasonable fee for access to the satellite.

HealthNet's potential is as great as the problems it seeks to resolve — access to information and the capability to communicate. The research component of the IDRC project will evaluate this potential and determine whether radio and satellite technology is both sustainable and effective in meeting HealthNet's many objectives. If HealthNet proves to be successful, it could advance health care in Africa and in the rest of the developing world.

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NETTING GAINS FOR SMALL FISHERIES

Loaded with ice, the truck rushes along the narrow dirt road, honking noisily and stirring up an impatient cloud of dust. Its destination is Uhanya beach, a small fishing community on the Kenyan shores of Lake Victoria.

Once the truck reaches the village, workers get out and, like a well-drilled army corps, load freshly caught Nile Perch into frozen storage holds. They will transport the fish to plants in the nearby city of Kisumu for processing and eventual export.

For the small-scale fish processors and traders of the Lake Victoria basin, this truck — and the rapidly expanding fish export industry it represents — is the competition. And competition these days is tough.

"The entire fishing industry in the Lake Victoria area has changed dramatically over the past 10 to 15 years," says Dr Gilbert Ogutu, the leader of an IDRC-funded project looking into the viability of traditional artisanal fisheries. "People who before relied on fishing for survival and modest income are now forced to either compete with larger fisheries or face complete marginalization."

The most significant change has been the sharp increase in fishing's contribution to Kenya's foreign exchange. Dr Ogutu, a lecturer at the University of Nairobi, estimates that as much as half of all fish caught in Lake Victoria are filleted, frozen, and exported to countries in the Middle East and Europe. For a region that produces over 90% of the fish in the country, this is a substantial figure. Traders and processors here vie daily for Nile Perch and other fish at the more than 70 major landing beaches along the lake's shoreline.

There have been advantages and disadvantages to the fish exporting boom. Some fishermen have benefited from higher prices for their catch and export-oriented processing plants have provided some jobs. But, like many other resources used for export, much of the revenue from fish is reserved for the relatively large and the relatively few.



The supply of Nile Perch to local markets around Lake Victoria has declined with the growth of the fish export industry.

BIG BUSINESS BENEFITS

Commercial firms have carved out an inordinately large slice of the market. They were quick to take advantage of the changes in Lake Victoria's fish population, which experienced an increase in Nile Perch. The firms developed overseas markets for frozen perch fillets and bought up an expanding proportion of the fish caught. They have been able to secure "client-patron" relationships with many of the fishermen, renting them motors for their boats and giving them higher prices in return for exclusive rights to their daily catch. Smaller traders have often found themselves boxed out of these deals.

Local fish processors have also suffered. Their traditional technology is not well adapted to processing Nile Perch, which is very oily. The technology is neither cost-effective nor efficient enough to compete with the equipment of the commercial processors.

Increased competition means sharply reduced incomes for the small-scale fish traders and processors, 75% of whom are women. Many of these rural women face bankruptcy and unemployment in an area where there are not many alternatives for making a living. Fishing is one of the few natural resources in the region; much of the land around Lake Victoria is non-arable.

The export industry also means that the supply of fish for local consumers has dropped while prices have been driven up. Poor people who live within 50 km of Lake Victoria's shoreline can no longer afford what used to be a low-cost source of protein. There are no programs to develop an alternate source of cheap protein and researchers fear that the scarce supply of local fish could have a severe nutritional impact in a few years.

Another result of changes in the fishing industry has been the increase in temporary communities on the shores of Lake Victoria. Uhanya beach, set up ostensibly to meet the demands of larger fisheries, is just one of the many communities that have sprung up along the lake's shores.

To work here, processors and traders walk as far as 80 km and stay away from their families for weeks, sometimes longer. They live in small wooden or metal shacks with roofs of corrugated steel. Children, whom mothers frequently bring with them, play around in the hot afternoon sun, avoiding the accumulation of waste that is inevitable where there are few sanitation facilities. "Such makeshift communities are not positive developments for the Kenyan people," says Dr Ogutu. "We have found that they draw people from miles away with the lure of quick money." The problem is that the fish processors and traders, mostly women, are often away from their husbands for extended periods of time. Researchers with the project have noticed an increase in marriage separations and a general decline in family cohesion.

ELIMINATE EXPLOITATION

For Dr Ogutu, who grew up near the lake, this situation must change. His main objective in the project is to give the people of the region a chance to make a living from the land — and water — they inhabit. "When the giant export firms get involved in the deals, it almost invariably becomes an exploitative situation for the people who live near Lake Victoria," he says. "We are trying to change that."

To break this cycle of exploitation and the low standard of living, Dr Ogutu and fellow researchers realized that the small-scale processors and traders must be taught skills and given new tools to compete effectively with larger, export-oriented fisheries. The ultimate goal of the project is to identify ways and means of improving the earnings of rural women fish traders. Specifically, this has involved several initiatives, from courses on basic accounting skills to the introduction of improved varieties of kilns for drying fish.

"We had to start with the basics," says Dr Ogutu. "Many of the small-scale traders and processors had no real business skills." Some, for example, did not take into account overhead costs in their estimation of income and found later that they were losing money.



Researchers have introduced more efficient methods for drying fish that will help small processors compete with commercial firms.

To combat this problem, the project sent 26 women to workshops on accounting and general business skills. Dr Ogutu says he has noticed significant changes: "Many of these women became immediately more knowledgeable about their businesses and more interested in the daily process of transactions, costs, and profits."

The project also encouraged the small-scale fish traders and processors to form co-operatives, the largest being known as KINDA. The KINDA cooperative, which in the local Luo language means "perseverance", allows these women to share resources and streamline ways of preparing fish and bringing it to market. Banks are also more willing to lend much-needed money to a co-operative than to individual traders and processors.

BETTER TECHNOLOGY

Another intervention designed to help the local people has been the refinement of the technology involved in the drying, processing, and marketing of fish. The technology needed to be made more efficient so that small-scale traders and processors could compete with commercial firms and still sell fish to local people at reasonable prices. In particular, smoking kilns used to dry Nile Perch were in want of improvement. Traditional kilns frequently rotted or eroded from exposure to the weather and they needed a large amount of fuelwood to smoke the fish — a scarce resource in the region.

Researchers developed four types of kilns. Some were close in style to the traditional kiln, because, as Dr Ogutu points out, "people are often afraid of

rapid changes, so they need to be allowed to change at their own pace." Although the refined, efficient kilns are more expensive to make, they smoke the fish in as much as half the time and use half the amount of fuelwood as the traditional kilns. Because they are made of brick and can be covered, these kilns are more weather-resistant. Dr Ogutu says the small-scale processors and traders can recoup their investments on the newer kilns in as little as a year.

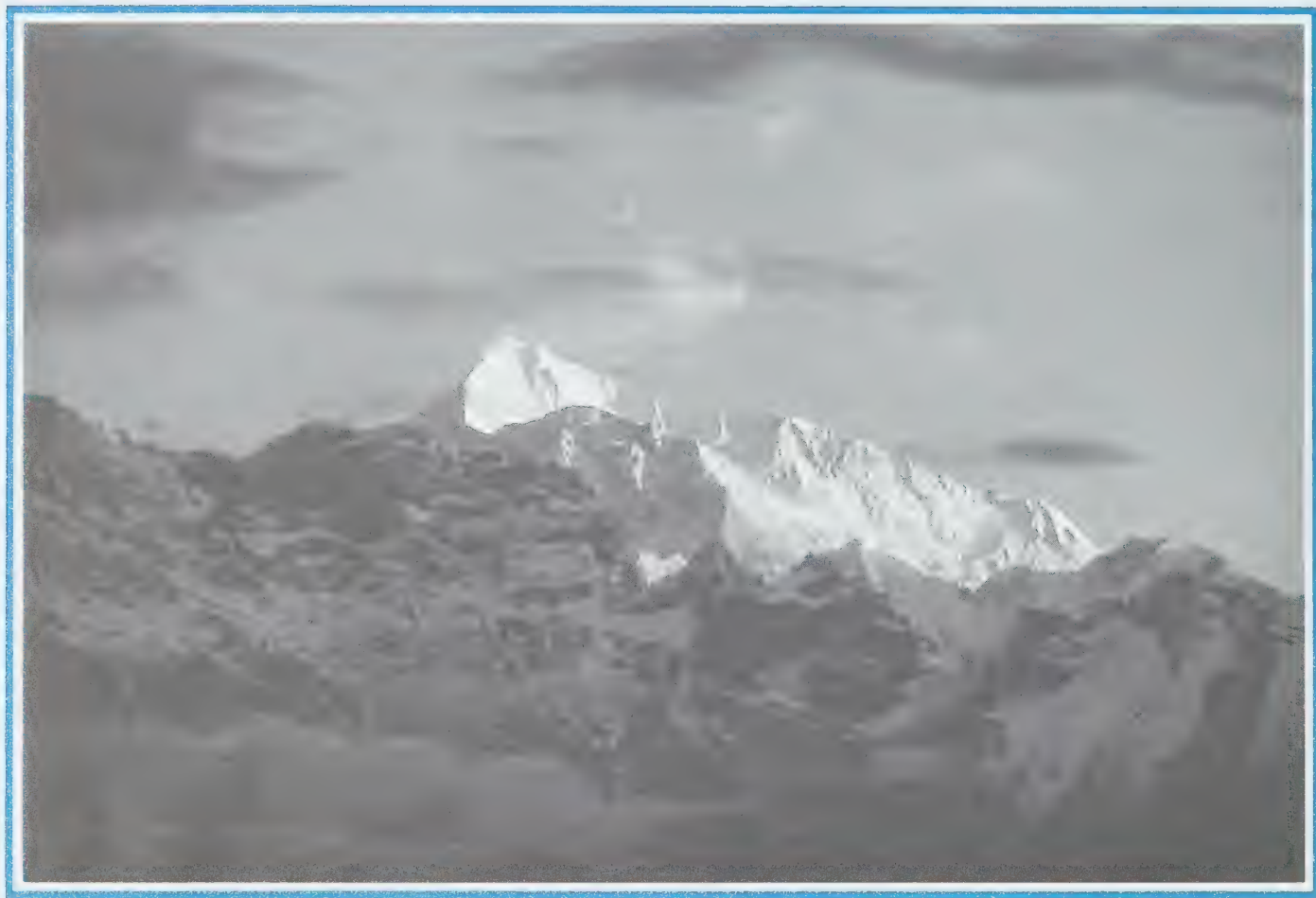
Another refinement has been the introduction of drying racks for the popular omena fish. This fish has commonly been dried by simply being laid out on the ground in the sun. In addition to a long drying period, this process resulted in high fish loss due to dirt and bacteria. Dr Ogutu and fellow researchers were instrumental in designing an omena drying rack made of mesh and metal that would dry the fish quicker and, because of its raised platform, protect the fish from bacteria on the ground.

These interventions, from both a skill-development and technological perspective, have been successful in helping many small-scale fish traders and processors of the Lake Victoria region, Dr Ogutu says. And that continues to be the goal of the project. "We are trying to create, or should I say re-create, a sustainable environment for the people who live closest to the resources — those people who ought to be benefiting from the fish."

Craig Harris in Kenya.



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CONSERVATION REACHES NEW HEIGHTS

The boundary between Nepal and Tibet stretches across the “roof of the world” — Mount Everest. The Tibet side, lying in the rainshadow of the Himalayas, is a high, flat desert plateau.

The steep slopes of Nepal, by contrast, are host to one of the richest ecological habitats in Asia. In an hour or two's walk, a hiker can pass through a vertical corridor of vegetation that extends from the gaudy flowers of the tropics to the fir trees and birches of sub-alpine climates.

These dissimilar landscapes are the focus of an international effort to preserve the unique environment surrounding Mount Everest. In 1988, the Nepalese government set up a task force to plan the conservation of the Makalu-Barun area that adjoins the Mount Everest National Park. The following year, the Government of the Tibetan Autonomous Region of China established the Qomolangma Nature Reserve on the peak's northern slope. Together, these two projects will conserve 20,000 sq km. When joined with the other protected areas surrounding Mount Everest, they will form a region of more than 42,000 sq km — about the size of Switzerland.

The challenge of planning, implementing, and managing two contiguous parks in two nations is equally enormous. The Woodlands Mountain Institute (WMI), an American non-profit educational and scientific organization, is helping the governments of Nepal and Tibet execute the project. WMI has found funding and research support for the initiative from international donors, including IDRC.

IDRC's support is focused on preserving Mount Everest's complex ecosystem. The project also sets out to protect a cultural resource. About 100,000 people living on both sides of the border will be affected by the creation of these vast parks. Conservation

programs throughout the world often leave local people economically marginalized and cut them off from their traditional natural resources. But the Mount Everest project seeks to combine conservation with sustainable development, showing local people how they can benefit from the park without damaging its environment. This approach is based on the "premise that the dignity and welfare of people and their cultural diversity are as important as biological diversity... the conviction that the key to preserving either one usually lies in the other," said J. Gabriel Campbell, the Director of WMI's Asian Environmental Programs in remarks to the IV World Congress on National Parks and Protected Areas held in Venezuela earlier this year.

LAST PURE SEED

The proposed parks encompass a region known as the "last pure ecological seed" of the Himalayas. UNESCO has also designated it as a World Heritage Site. The Nepalese side includes seven valleys that radiate from Mount Makalu, the fifth highest summit in the world. These valleys shelter some of Nepal's last remaining pristine forests and alpine meadows. The park also contains a single sweep of mountain slope with an altitude transect of 8000 metres — a continuous strip of vegetation that begins with tropical plant life at 1000 metres, rising through sub-tropical, temperate, sub-alpine and alpine zones before reaching the snow and ice of the nival zone at 8000 metres. This transect reveals a panorama of biodiversity. The great range of precipitation (4,000 mm to less than 200 mm) and differences in soil and sunlight make these habitats even more complex. Researchers in Nepal recorded more than 3,000 species of flowering plants and about 80 species of mammals, including the endangered red panda. "If there is a Yeti snowman, you can be sure that this is where it will be preserved," joked Dr Tirtha Bahadur Shrestha, the botanist and ecologist who heads the Nepalese Task Force for the Makalu-Barun Conservation Project.

This biological richness is matched by the region's cultural diversity. The people speak more than 15 different

Tibeto-Burman languages and dialects. They depend on the natural resources of the area for their survival, working in subsistence agriculture and livestock farming. Their existence is marginal. Nepalese researchers found that 73% of the households reported a shortage of food at some point during a calendar year. Health care and educational facilities are limited. The Nepalese villagers have to walk for days to attend a market and more than a week to reach a road. To supplement their meagre incomes, they sell cloth woven from wild nettle and paper made from a local shrub. They also collect herbs to sell in India — a 10-day journey. Some find work as porters for the occasional tourist who visits the region.

In Tibet, farming is practiced up to 4,500 metres where water is available for irrigation. At higher altitudes, only grazing is possible. Nomads tend a variety of animals, including cattle, sheep, and goats, depending on the elevation. At the highest altitudes, they graze yaks.

ENVIRONMENT AT RISK

The people's efforts to survive on these mountain slopes have come into conflict with nature. Population growth has placed a burden on natural

resources, leading to over-grazing, cultivation of marginal land, and deforestation. Certain trees that are harvested for firewood, such as juniper and caragana, are difficult to regenerate because they grow slowly in such high altitudes. Rare birds are trapped for food and the remoteness of the area makes it difficult to control hunting.

Future human activity, however, poses an even greater threat to the environment. The World Bank is funding a US\$1 billion 402-megawatt hydroelectric dam on the Barun River and a 200-km access road that will border the proposed park area. More than 3,500 workers and their families are expected to settle on the site, ready consumers of the area's natural resources. The road will also bring in more immigrants, business people, and tourists. Although there are few visitors to Makalu-Barun now, the tourist industry could grow at a rate similar to that around the Mount Everest summit. In 1963, the summit area attracted 20 visitors. In the year 1989–1990, the number had risen to 13,000.

The planners of the Nepalese and Tibetan nature preserves aim to balance these human demands with conservation needs. Research is underway in Tibet, although it is hampered by



The project will show local people how they can benefit from the park without damaging its environment.

enormous distances and the difficulties of working in a desert environment 5,500 metres high. The Qomolangma Nature Preserve Task Force has completed a draft master plan for the park that combines findings from scientific research and local consultation. Researchers completed surveys on a variety of sectors, including vegetation, economic development, cultural conservation, and wildlife management. The ministries of health, education, and tourism have already incorporated some of the preliminary data. The management plan would establish three zones in the park with different types of activities marked for each section. The core areas of the park would be kept free of human activity, save for some seasonal grazing and the presence of monasteries. "We plan to link conservation education to the traditional culture of holding both mountains and life sacred," said Changlo Chen Wangchuk, the Director of the Tibet Development Fund and a member of the task force.

FIELD RESEARCH

The Nepalese task force has presented its management plan, the product of hundreds of hours spent exploring habitats and talking with local people. "We spent about 19 months in the field to come up with the plan document," said Dr Shrestha. We did it in a participatory learning process, spending our days with local inhabitants." The scientific, biological and socio-economic research resulted in 20 papers, which in turn formed the basis of the management plan.

The plan called for the creation of a national park joined by a conservation area. (The park was officially established in November 1991.) The plan divides the park into three management zones: nature reserves in which natural ecosystems would be strictly protected and human activity confined to scientific research; protected areas where traditional land use practices would be allowed, albeit carefully controlled; and special sites and trails for the use of tourists and religious pilgrims.

The conservation area will act as a buffer zone to the park and generate economic opportunities for local people. Like the park, the conserva-

tion area will be divided into categories based on land use: biodiversity protection; community forest and pasture; agroforestry; and agriculture and settlement. Planners will focus on sustainable ways for local people, especially women, to increase their incomes through the processing of natural resources from the conservation area and getting access to credit for agricultural work. One example of how modified agricultural practices could improve the local economy relates to livestock. Higher milk producing animals could be introduced and used to promote stall feeding, which is less environmentally damaging than grazing. Slope degradation would be prevented and at the same time, increased milk production would lead to greater earnings.

Planners also hope to establish a museum of cultural and natural history. Although it would function as a visitors' centre, its exhibits would also encourage local people to appreciate the richness of their heritage. This has already happened in the case of the tetra centron tree, which researchers discovered in a small village. A fossil of this tree has been found in Japan and researchers are using the two discoveries to support the theory of continental drift. Numerous papers have been written about the tetra centron but only after visitors to the area photographed the tree did the villagers realize its importance and start to protect it. "We think the same thing will happen with the other items which they neglect," said Dr Shrestha. "If we put them in the museum then they will start preserving traditional artifacts such as the twin-blow whistle, a musical instrument that only the Rai people in the area make and use."

LOCAL INVOLVEMENT

More than 70% of the resources of the Mount Everest project are being directed toward the involvement of local people. Regulations on every aspect of the park development will be established only in consultation with local residents. They will also help maintain the park, working as game scouts and rangers. It will be the first park in Nepal not to use the army for protection.

The Mount Everest project is a model of how the conservation and protection of nature's resources can be compatible with local economic development and participation. Dr Shrestha describes the philosophy behind the project in terms of a parable. A hungry farmer faces a dilemma. "Should she cook her last ear of corn or save the seeds for the future? We have a Nepalese proverb: 'protect your body in a crowd, protect seeds in a famine.' The wise woman saves her seed for the future. In the same way, the Makalu-Barun Nature Park and Conservation area has been designed to preserve biodiversity's seeds for posterity, to draw upon mountain wisdom for development and to value local people as resources for conservation."

*Jennifer Pepall in Ottawa
Prakash Khanal in Nepal*



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A RESEARCHER'S STRUGGLE

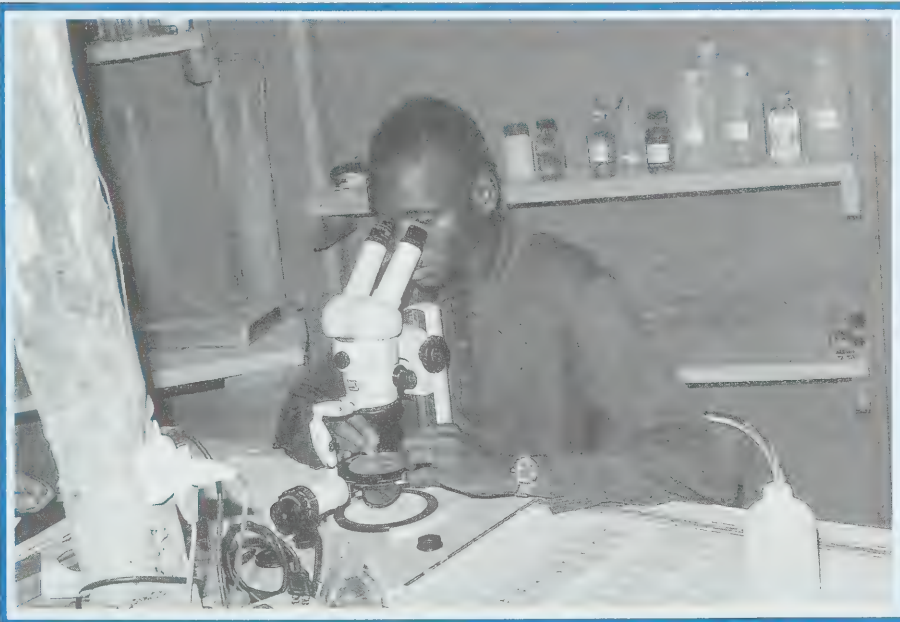
Millions of people living in developing countries are cut off from the mainstream of social and economic progress by a combination of harsh economic circumstances and disease. Research is essential to the struggle to overcome these problems. But administrative delays, inadequate facilities, and outdated equipment paralyze research efforts, creating a climate of futility and frustration among scientists in the South.

Generally, working conditions at research institutions are less than satisfactory. The lack of running water and electricity is particularly serious. On the Njala University College campus in Sierra Leone, running water is only available for less than two hours a day. Some parts of the campus get no water at all. Electricity is supplied for only five hours each day, from 7:00 PM to midnight. Power surges can damage what equipment is available and there are no spare parts to fix it.

Salaries cannot support family life. Food shortages and high prices quickly absorb any salary increases. Researchers in the South are often forced to find additional sources of income to supplement their low wages. Research time and productivity is thus compromised. When basic needs are lacking, a researcher shifts his or her attention from conducting experiments to making ends meet.

Most universities have no local funding for research. The majority of good research projects carried on at the University of Sierra Leone, for example, are funded by external agencies. These agencies need government approval before they award any grants. The bureaucratic delays in getting this support are enough to discourage any researcher without the will to fight. Even after a grant is approved, payments can take months to process.

A researcher must often travel widely to communicate effectively with his co-workers and with the appropriate authorities. Limited transport, poor roads, and scarce fuel mean that a 200-km journey can take a day or longer to complete. Poor transportation systems are aggravated by a shortage of spare parts needed to keep vehicles in good running order.



Laboratory facilities are often rudimentary in the South. Many scientists, discouraged with the climate for research in their own countries, look for jobs overseas.

Communication systems are even worse. In Sierra Leone, there is no direct telephone line between the capital, Freetown, and provincial cities. I lived on a university campus some 140 km from Freetown and I had to make a six-hour round trip to the city to phone overseas collaborators. Calls may get through after hours of waiting, but sometimes the connection is never made. Information that could be simply obtained by a phone call can take days, weeks, or even months to arrive depending on its source.

All these conditions constrain the ability of researchers in the South to find solutions to their country's development problems. Discouraged, they look for jobs overseas. The extent to which this brain drain is affecting research development and capability strengthening cannot be over-emphasized.

After eight years of working in Sierra Leone, I am now in the United States as a Senior Fulbright Research Fellow at the Johns Hopkins University, School of Hygiene and Public Health. It is a totally different world, marked by academic excellence and innovative research. I had to work very hard to catch up with current advances in biotechnology.

Communication is effortless. It takes me only a minute to call Sierra Leone and even less to order research supplies by telephone. I can get the latest publications related to my research from the library across the street. If by chance they do not carry a particular journal, they can get it from another library in four to seven days.

The immediate access to information, superb facilities, and supportive faculty members enable me to conduct my research without distraction on *onchocerca volvulus*, the parasite causing river blindness that affects 17 million people worldwide. Given a better educational system and an improved environment for research, such work could and should be done in Sierra Leone. Research questions are best tackled where the problems exist.

Dr Aiah A. Gbakima, Head of the Tropical Diseases Research Unit at Njala University College, University of Sierra Leone.

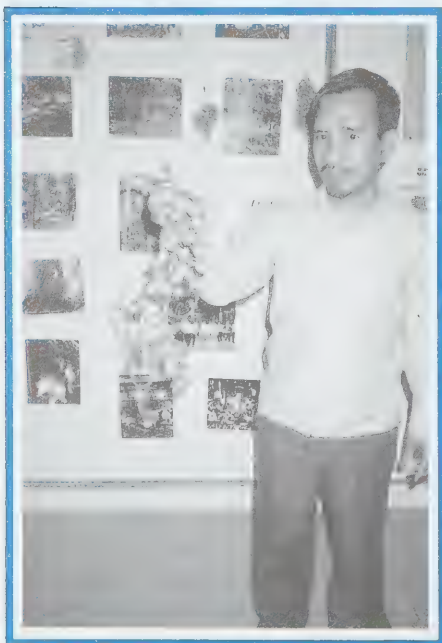


RATTAN ON THE RISE

Kassim Omar's small rubber plantation is situated in the dense jungle area of Dengkil, about 40 km southwest of Kuala Lumpur in Malaysia. Although rubber is the main source of his livelihood, he has been trekking through the foliage in search of a spiny plant that holds out great potential for this Southeast Asian country: rattan.

"All these years I have been making extra money by selling the rattan I collect from the jungle near my house," he says. "But now there is less and less rattan for me and my friends to collect." Mr Kassim's trial plot is only one part of a larger IDRC-funded project on rattan by the Forest Research Institute of Malaysia (FRIM). The institute is actively conducting research into the mass production of rattan, with a view to helping Malaysia become the world's number one producer of raw rattan by the end of the decade. But, say researchers, this can only be achieved if inter-cropping of the plant in rubber plantations is carried out in a concerted manner. "Rattan in its natural state requires tree crops for shelter and support, both of which are provided by rubber trees," explains Mr Zollpatah Abdul Rahman, a research assistant with the project.

This is why FRIM has, since the early 1980s, established 14 trial plots on small rubber plantations all over the country. With a total land space of 1,000 ha, researchers are encouraging these small landholders to grow rattan on a commercial basis. And the research seems to be paying off.



The harvest of rattan for the local furniture industry has limited the supply of rattan seeds from their natural source — Malaysia's forests.

"I didn't know I could cultivate rattan in my rubber plantation until FRIM officers pointed it out to me," says Mr Kassim. He has some 500 rattan vines planted in his 1.8 ha rubber plantation and has attended a course on rattan growing conducted by FRIM. In seven years he will be able to harvest his crop.

"Although it will take some time before I can harvest the rattan, at least it guarantees my family an extra income when the time comes," he says. "This is a lot better than nothing."

There are 1.9 million ha of land under rubber in the country, but only 1,050 ha have rattan as an inter-crop. Another 16,050 ha of rattan is also being cultivated in forests of Malaysia.

SURPLUS FOR EXPORT

FRIM researchers contend that if only 500,000 ha of rubber land were planted with rattan, Malaysia would have enough to cater to its domestic furniture industry and still have surplus for export.

But what, ask researchers, has Malaysia got to show for its current rattan production? A meagre 2% share of the US\$4.5 billion world market for rattan.

FRIM researchers say the gross value of raw rattan collected amounted to about 5 million Malaysian ringgit a month (about US\$1.85 million), but the value could be increased more than seven times if the manufacturers concentrate on domestic processing, as in furniture making.

It was with this in mind that the government decided to impose a total ban on the export of raw rattan in December 1989. The ban helped to increase Malaysia's exports of rattan furniture. In 1988, it exported US\$13 million worth of rattan furniture and the following year, that total increased to about \$17 million. In the first 10 months of 1990, the exports reached about \$16 million.

IDRC's funding of FRIM's research into rattan dates back to 1984, with the launching of a project to develop effective techniques for the mass propagation of commercial rattan. The first phase ended in 1988 and resulted in the creation of a tissue culture laboratory in FRIM to mass produce rattan seedlings.

FRIM's senior research officer, Dr Aminuddin Mohamad, says there is an urgent need to produce the seedlings through tissue culture because of the fast-depleting supply of rattan seeds. He said rattan plants in their natural habitat — the forests — were being felled continuously to meet the demand of local furniture manufacturers.

"If the plants are not replaced quickly enough, our supply of rattan will drop drastically," he says. "But superior quality seeds are hard to come by: this is why we need to propagate seedlings through tissue culture."

He says that since last year, FRIM's tissue culture laboratory has been producing more than a hundred rattan seedlings a week. The seedlings are of the *Calamus manan* variety, a rattan of large diameter well-suited to making cane furniture. But the *Calamus manan* is only one of 106 varieties available locally.

FRIM and a private company are planning a joint project to plant the seedlings on a commercial basis. They have

already identified a site in the state of Negri Sembilan, south of Kuala Lumpur. "The idea of having a seed garden is to develop a gene pool of superior rattan seedlings for mass planting purposes," says Dr Aminuddin.

FRIM also has a special storage centre where rattan seeds are kept frozen in cold nitrogen. If the seeds are not stored in this way, they can ferment easily or become prone to fungal infection.

COURSES OFFERED

The second phase of the FRIM-IDRC project involves the dissemination of rattan growing technology to the people of Malaysia. Dr Aminuddin says the institute is preparing rattan growers for the technology by conducting courses. Since January 1990, it has conducted four such courses. The more than 400 participants included rubber small-holders, government agencies, and private plantation corporations. Each course includes a detailed study of how to cultivate rattan, discussions on the various varieties of rattan, how to set up a rattan nursery, pest control, and the economic potential of growing rattan. Says Dr Aminuddin: "We are trying to tell people that rattan can be grown quite easily in their own backyards."

Another aspect of dissemination was the setting up of trial plots in small rubber plantations across the country. FRIM research assistant Mr Rahman says the response to its trial plots was "very encouraging".

Researchers and farmers found out that *Calamus manan* grows well with rubber trees and brings higher returns compared with other species. Rattan, it was also noted, could be planted extensively as a single crop but growing it in rubber smallholdings means lower costs. Farmers liked the fact that the maintenance of rubber trees and rattan could be carried out simultaneously. Other factors that influenced rattan's growth included the amount of shade it received and the sustainability of the soil.

TREASURE TROVE

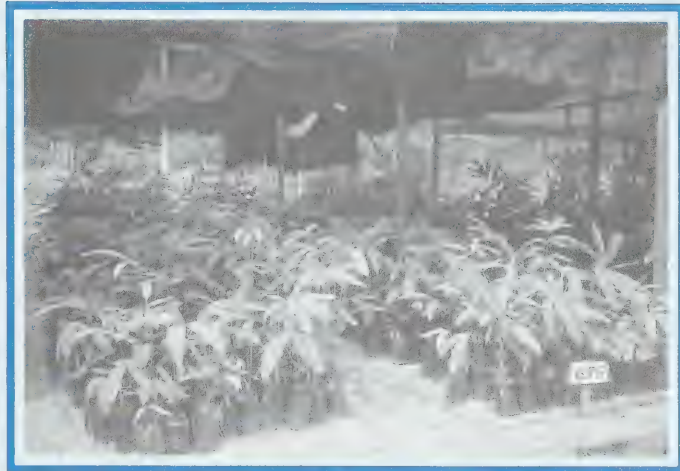
FRIM also has a Rattan Information Centre, funded by IDRC, that was set up in 1982. The centre, housed in the institute's library, is a treasure trove of information on rattan. Staff here collect data, publications, news clippings, handbooks, and catalogues on rattan from all over the world.

The centre also publishes a bulletin twice a year which is read by scientists and rattan cultivators alike. The bulletin has two sections, one dealing with research carried out by scientists and the other on rattan cultivation.

While FRIM is encouraging smallholders to grow rattan in their rubber plantations, it is also telling them that they stand to make a lot of money in the local and international markets.

FRIM Director General, Dr Salleh Mohamed Nor, says each *Calamus manan* seedling only costs a few sen (cents) and when it is ready for harvesting, each piece of raw rattan (measuring 45 mm in diameter) will cost fetch four ringgit (approx. US\$1.50), while treated rattan will fetch up to eight ringgit (about US\$3) a piece.

He estimates that the harvest of rattan on a 100 ha plot can be valued at US\$148,000, while the initial expenses to plant the seedlings will cost only about \$30,300. "No doubt, this is



FRIM's tissue culture laboratory produces more than 100 rattan seedlings a week.

a long-term investment as it takes at least 12 to 15 years for rattan to mature," he says. "But the returns are definitely worthwhile."

Dr Salleh says that if *Manan* can be planted in the country's 1.9 million ha of rubber plantations, he is confident that Malaysia will become the world's biggest producer of rattan. He estimates that total investments to cultivate rattan will come up to several million ringgit. But, he adds, the amount is nothing compared to the US\$4.5 billion world market for rattan.

"We only share 1 to 2% of the world market and since *Calamus manan* is a tropical commodity, I cannot see why it cannot thrive in this country," he says.

FRIM is now trying to get commercial banks to support investments in long-term cultivation of rattan to help Malaysia capture the world market. Dr Salleh says several banks have inquired as to the viability of such investments and adds that FRIM is willing to discuss the matter with any bank interested in rattan plantations.

"We are willing to supply all information to interested parties concerning rattan cultivation in rubber estates," he concludes. "We are confident that banks which have been adopting a wait-and-see attitude will eventually invest in the potentially lucrative process of rattan cultivation."

Press Foundation of Asia in Malaysia



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PHYSICIANS TAKE TO THE FIELD

One-quarter of Ethiopian children die before they reach the age of five, most of them from infectious diseases. Their deaths can be easily prevented with adequate medical supplies and treatment. But these are scarce in a country afflicted by poverty, drought, and civil unrest.

Only one-third of the population has access to any health services and in the rural areas, health spending amounts to only 30 cents US per person a year. Ethiopian authorities, however, have been working with Canadian physicians to improve the country's health care system. The project is helping the Ethiopian government to implement a strategy of primary health care by building a core group of people trained in district health management.

The initiative is a joint effort of several Ethiopian institutions — the Ministry of Health, Addis Ababa University, the Jimma Institute of Health Sciences, and the Gondar College of Health Sciences—and McGill University in Montreal, Canada. The World Health Organization (WHO) and UNICEF are also participating in the project. IDRC and the Canadian International Development Agency have provided funding since 1987.

The Ethiopian government has recognized that the development of effective primary health care depends on a decentralized system of health management and community-oriented medical research. Through the establishment of post-graduate degrees in public health, an accelerated six-month program for district health managers, and overseas fellowships, the project is training health professionals to work in Ethiopia's 359 awrajas (districts). "You can't promote self-help care if you are physically and culturally far from the people," says Dr Miriam

Were, WHO representative and Chief of Mission in Addis Ababa, "especially in a country with so many climates, races, and traditions. The district managers will be the ones to link the system to the people, stimulate community involvement, and draw the pieces of the puzzle together."

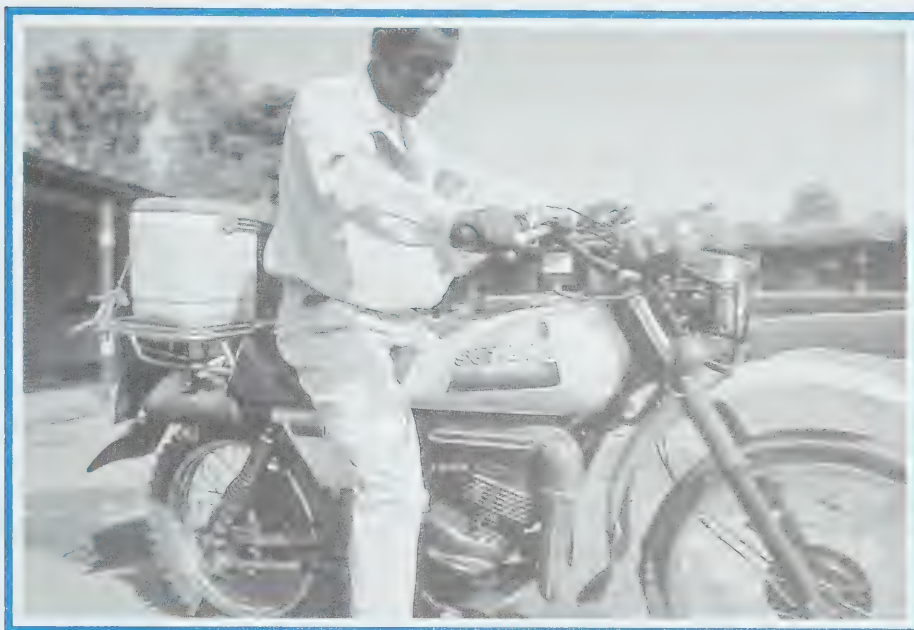
WORKING GRADUATES

Physicians with two years of experience working in rural areas are eligible for enrolment in the training programs. Already, 38 students have received their masters degrees and 131 have graduated from the six-month program. Most of the graduates are working as district health managers. One of the first students, Dr Mentenot Yohannes, wrote his thesis on byssinosis, a respiratory illness associated with the inhalation of cotton dust. His research resulted in measures to reduce respiratory diseases among textile mill workers.

District health centres now serve about 40% of the country. Each district



One out of every four children in Ethiopia dies before reaching the age of five. Adequate medical treatment could prevent most of these deaths.



A health worker is ready to depart on a mobile immunization program.

manager is responsible, with his or her team, for implementing primary health care strategies and co-ordinating health resources in the district. Rural clinics are rudimentary and minister to the most basic of needs. Often, a manager's first priority is to convince local leaders to build latrines or to join aid workers in protecting sources of drinking water from becoming contaminated.

Dr Mesfin, one of the students, is health manager for the Suluta district, a fertile, wheat-growing plateau north of Addis Ababa. His domain comprises a daunting 1,164 sq km with 129,000 inhabitants. The health care infrastructure — consisting of a health centre with about 12 support staff, three stations run by health assistants (high school graduates with 18 months of training), and eight health posts staffed by community assistants with three months of basic training in first aid and hygiene — supports only a quarter of the villages in the district.

Once a week, Dr Mesfin works on his thesis — a field trial of three kinds of oral rehydration therapy. He is comparing two pre-packaged solutions and a homemade remedy to find out which is the most effective in treating diarrhea. The homemade treatment of cereal and salt has so far given the best results. His research involves distribut-

ing questionnaires (and often grain, milk, and kerosene owing to the scarcity of transportation) in 12 villages. There, he has set up oral rehydration therapy corners and provides training to explain how the therapy works. Education is a large component of a health manager's work. Many people believe that diarrhea is caught from the evil eye and can only be cured by pulling teeth.

VISIT STUDENTS

Once a month, if they are able, project physicians based at Addis Ababa University visit the field to supervise students' research and to discuss management problems. Dr Joyce Pickering of McGill University, the project director, is in Hara, 19 dusty kilometres east of Addis Ababa, to see her student Dr Filimona. He is studying the sexual behaviour and attitudes of local high school students. The number of illegal abortions has doubled among this group in three years. This rate makes abortions the second most common cause of hospital admissions in the area. He hopes his study will make the community more sensitive to the seriousness of the problem.

Drs Filimona and Pickering go over the pre-test results and the organization of the questionnaire. They also discuss the health profile he has done

for the region and his action plan, both essential components of the students' work in the field. The action plan defines priorities in relation to the major health problems in the awraja. The action plan and the profile then become the basis for official planning for health development in the district.

The two doctors then visit the area clinics. Dr Pickering gets Dr Filimona to ask the staff many questions about what they are prescribing, how they are compiling data, and whether they know how to plot graphs. "This follow-up is essential," she explains, "but it must be instigated by the students. I try to make them more systematic and realistic, and to give them back the initiative they seem to lose under totalitarian regimes. The impetus must come from them."

Dr Pickering says that the Canadian doctors are teaching systems, such as those for managing patient flow and for the collection and interpretation of data. There are no records in rural Ethiopia, not even of births and deaths. Appropriate education and the effective distribution of medicine depends on the availability of basic data on health habits and common diseases.

To this end, the project brought over a medical librarian to help her Ethiopian counterparts learn how to



Dr Joyce Pickering, the project director, consults with one of her students.

organize their books and circulate them more efficiently. Students had hoarded books because of the scarcity of texts. Now, computers and CD-ROMS have given them access not only to abstracts but to entire medical texts. The students are able to plug into a global network of information that will help end their isolation.

STANDARDS IMPROVE

The project doctors are starting to see a difference in health standards between those districts with health managers and those without. The students' work during the meningitis epidemic of 1989 also demonstrated the program's success. When the epidemic broke out, about 18 students who were nearing the end of their training were sent out to the field, along with graduates of the program. They set up treatment sites and distributed vaccines. Over a two-month period, about six million children were vaccinated under difficult conditions. "An early test of the program's effectiveness was the rapid response of the nearly finished masters students and their ability to adapt quickly to the crisis and set up a response to it," says Dr Charles Larson, of McGill University, who was then the director of the project. The epidemic also under-

scored the urgent need to bring health care closer to the people.

The steady work of project members throughout the upheaval of the May 1991 coup earned them the respect of the current regime. When the government of Mengistu Haile Mariam fell to rebel forces, everything stopped — technical support was withdrawn, aid was frozen, even emergency supplies were not getting through because of looting and fighting on the roads. But when the airport opened six weeks after the coup, the team of McGill physicians was back. Dr Pickering says she and her family would not have left at all if the Canadian Embassy had not insisted on their departure. "I couldn't imagine deserting my students at such a crucial time," she says.

There has been some opening up of the country since the new government assumed power. People are no longer afraid to talk freely about politics and educated Ethiopians are coming home. The project's first overseas fellowship students have completed course work at McGill and are back in Ethiopia doing their thesis research. But the health system won't be entirely self-sufficient until the economy is revived so that drugs, books, and computers can be bought and staff can be maintained.

In the interim, what is needed is both practical and moral continuity. "The gift of the Canadians has been their personal support," says WHO's Dr Miriam Were. "Material and financial support is important but in times of instability, it's just very nice to have a hand you can hold."

Wendy Penfield in Ethiopia



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DEVELOPMENT ON DISK

Governments, corporations and private individuals invest millions of dollars each year in international development. But despite this commitment of resources to a common goal, there is little sharing of information among organizations. Moreover, developing country governments seldom have access to this kind of data, which they would find very useful.

An IDRC initiative is offering a solution to this problem. Material on development activities is now being collected from as many sources as possible and published on CD-ROM. The first edition of the database, known as Development Activity Information (DAI) CD-ROM, is already available, and a second edition is planned for early 1993. These two CD-ROMs are being produced on a trial basis; if they are well-received, IDRC will publish future editions.

The DAI CD-ROM contains almost 70,000 records representing the activities of more than 200 international, regional, and national agencies and non-governmental organizations. All of the development activities executed or funded by the United Nations and its specialised agencies in 1990 are on the CD-ROM, as are the development co-operation transactions for 1989–1990 of the governments of Australia, Canada, Japan, the United States, and twelve European nations. The Canadian International Development Agency, the Japan International Cooperation Agency, and the United States Agency for International Development also supplied additional information from their own databases.

Other entries on the DAI CD-ROM describe research projects, such as those on the database contributed by IDRC's Inter-Agency Development Research Information System (IDRIS), and the Special Programme for African

Agricultural Research (SPAAR). The Export-Import Bank of Korea, the Government of Germany, and the Inter-American Development Bank gave details on loans and grants extended to developing countries.

In order to combine this wide range of information on a single CD-ROM, the Common Exchange Format for Development Activity information (CEFDA) format was developed. CEFDA allows organizations to exchange their data or to pool it in a product such as the DAI CD-ROM, regardless of differences in computers, computer software, or database methodologies.

Information on the CEFDA format, including a manual, can be obtained free of charge from IDRC. The DAI CD-ROM is available to subscribers in

development assistance agencies at prices ranging from US\$1500–2500 for a single CD-ROM, to US\$5,000 for an associate or \$10,000 for a full subscription. The latter entitles the subscriber to additional products and services.

Developing country governments and non-profit-making organizations may receive the DAI CD-ROM free of charge.

Mary Campbell

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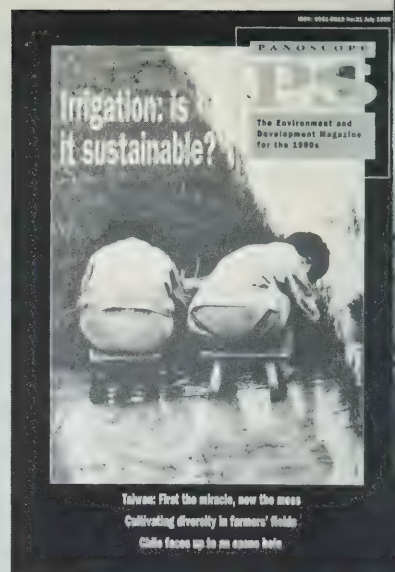
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CANADA

GIS
Better tools for
local decision making

IDRC REPORTS

IDRC Reports is published quarterly by the International Development Research Centre (IDRC) of Canada. Its aim is to keep an international readership informed about the work IDRC supports in developing countries as well as other development issues of interest. The magazine is also available in French as *Le CRDI Explore* and in Spanish as *El CIID Informa*.

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FOCUS

Years of field research, mountains of surveys, stacks of censuses and reams of studies: the data piles up relentlessly in the North as well as the South. Data banks whose capacities are always growing store this knowledge at a faster and faster rate.

But all of this knowledge sometimes leaves us overwhelmed when the time comes to make an enlightened decision. Geographic information systems (GIS) are a step in the right direction. This technology furnishes decision makers and managers with the means to manipulate, compare, remove or add data to maps displayed on their computer monitors.

A relatively new technology, GIS appears destined for a brilliant future in the communities and nations of the developing world. So long as it draws upon recent and precise data, it can clarify an ill-assorted set of information and inspire managers who might otherwise concede defeat to make a confident decision.

In the pages that follow, we bring to your attention concrete examples of projects that all depend on GIS. We hope you enjoy reading about them.

Editor-in-Chief



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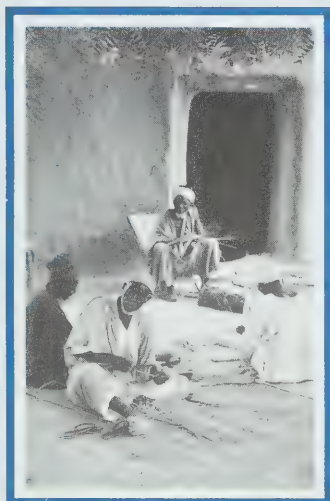
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GEOGRAPHIC INFORMATION SYSTEMS

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The marriage of geography to mathematics and electronics can provide the reliable information vital to sustainable and equitable development.

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Peter Newton



INFORMATION FOR DECISION MAKING



GIS uses geography, mathematics and electronics in applications such as soil resource management. Potentially, it could assist in decisions about cultivating mountain hillsides such as this one in Cuzco, Peru.

It is impossible to have sustainable and equitable development without free access to reliable and accurate information.

The information required for decision making was the topic of an entire chapter of the Agenda 21 action plan drafted during the recent Earth Summit held in Rio last June. Information is a common theme throughout the Agenda 21 document as well as in other conventions and agreements negotiated during the Summit.

Information has its own technologies, which are developing so rapidly they are difficult to track, particularly for developing countries. A Geographic Information System (GIS) provides the best example of this. This

technology, created to process and manage spatial data originating from a variety of sources, facilitates the extraction of the information necessary for decision making in almost all areas of development.

The growth in environmental awareness, as well as the desire to protect the environment and to implement sustainable development, is currently leading decision makers to seek out tools to assist them. The tool of choice is GIS.

Structurally, GIS may be defined as an effective combination of software, hardware and knowledge which can harmonize spatial data from a diversity of sources, and facilitate decision making.

Conceptually, it represents the point where geography, mathematics and

electronics meet and combine to catalogue, superimpose, examine and visualize physical, social and economic phenomena, and assess their impact in space and time.

Functionally, it is a tool to collect, analyze and process spatial data, and to derive the information that provides the basis for action.

Let us assume that you want to study the agricultural improvement of a specific region to ensure that it is self-sufficient in providing food for its inhabitants. You would require physical data (soils, vegetation, topography), hydro-climatic data (precipitation, winds, temperature, sunshine, infiltration, evaporation, run-off), information on the economy and infrastructure (access routes, fertilizers, energy, transport, equipment, proximity of

markets); as well, you would need information regarding the environment (pesticides, herbicides, capacity to absorb pollutants), society (regulation, taxes and duties, labour availability, population, eating habits) and agricultural practices (seeds, optimal production conditions, bank loans). Using a geographic information system, data at a variety of levels, originating from a variety of sources and collected in a variety of ways, can be aggregated, organized, structured, analyzed and compared on a map, so as to provide, after processing, various agricultural development scenarios, set out as a function of goals stated and development models selected.

In 1989, Hurricane Hugo devastated the Antilles and the south-west of the United States, leaving dozens of dead and billions of dollars in damage. In the aftermath, several universities and government agencies (both municipal and regional) used GIS to assess the damage and design restorative measures. GIS was used to: develop assis-

tance programs for victims; assess the impact on coastal forests; determine the changes in the river banks; establish the jurisdiction of the states along the coast; develop reforestation programs; create databases for soil use and economic development; set up impact and remediation studies; analyze the drainage pattern and the damage suffered by bridges. This example gives an idea of the multiple capabilities of GIS as an analysis and management tool.

GIS also facilitates access to cartographic databases and to interdisciplinary exchanges, as well as between sectors. Adopting GIS to manage data and information inevitably leads to changes in the structure of the institution and this frequently results in greater precision and efficiency.

However, it would be presumptuous to suggest that GIS could settle all the problems of the developing countries. Other techniques such as remote sensing by satellite are also essential. GIS imposes a rigorous logic on an

organization and allows multiple scenarios to be drawn based on physical, social or economic parameters. GIS gives free rein to the intuition and creativity of the user. Remote sensing and GIS now allow us to better understand the dynamic relationship between different components of the environment. These tools allow us to open the door to modelling the consequences of the development of a region.

Given its 20 years of experience in information sciences, IDRC is very much involved with GIS. Since 1986, IDRC has selected geographic information systems as the focus of its Geomatics program. IDRC has financed more than a dozen applied research projects in Africa, Asia and Latin America. The projects have involved subjects as varied as the study of coastal zone development, the management and conservation of water and soil resources, municipal management, fertility and erosion, flood control, assessment of socio-economic changes and the mapping of malaria. Some of these projects are the subject of articles in the present issue of IDRC Reports. IDRC undertook pioneering work in several countries, and before long, there were experts in this technology including senior government officials.

As an Agenda 21 agency, IDRC intends to enhance support for research and development of GIS, to bridge the existing gap between the availability of data and their interpretation for sustainable development.

Djilali Benmouffok is a Program Officer with Information and Communication Technologies at IDRC.

GIS: WHAT IS IT?

GIS stands for "Geographic Information System", an information technology designed to collect, structure, analyze and manage large volumes of spatial data and their attributes. It is similar to having a map library, statistical data, drawing, map overlay and analysis tools all at hand; and all of these on a computer. There are a number of systems on the market, something for every taste and pocketbook, ranging from a few hundred to several thousand dollars. Some of these are intended for specialized uses or for sectoral applications such as forestry, engineering, land registry; others are more general. Some emphasize the quality of their graphics, while others claim to have more analytical power.

A complete, functional GIS work station generally includes a micro-computer with 2 megabytes of RAM memory, a colour monitor, a digitizer, a printer, a plotter and an extra data storage device; in addition, it has an operating system (DOS or other) and the GIS software.

Even though a great deal of effort has been devoted to making GIS easy to use, it still is aimed primarily at information specialists and technicians. To become a GIS user, one must have training in spatial science (cartography, geography or another geography-based discipline) and a sound knowledge of information science. Even with all this background, at least six months of training is required to be able to use GIS effectively.



LOSING GROUND

The World Bank predicted in 1979 that Nepal would have no forests left in 16 years due to population pressures and the high demand for forest resources.

Sir Edmund Hillary, famous as the first person to climb Mount Everest's summit, claims Nepal's forest cover has shrunk since his historic climb in 1953.

Media reports allege that Nepalese farmers' wood-cutting practices are responsible for recent flooding in Bangladesh.

All of these claims are exaggerated, according to an IDRC-sponsored research team studying the relationship between land use patterns and soil degradation in a Nepalese watershed. The team is made up of researchers from the Integrated Survey Section of the Nepalese government's Topographical Survey Branch and the Department of Soil Science at the University of British Columbia in Canada.

Using geographic information system (GIS) technology, they have found that forest cover has actually expanded in the last decade. Overall soil fertility, however, is declining rapidly.

The researchers aim to identify the causes of soil degradation in the small watersheds of Nepal's hills and to promote sustainable biomass production. To help them attain this goal, they have developed a micro-computer based GIS that incorporates data on biophysical resources and land use. Dr Hans Schreier, a UBC mountain soil specialist and the Canadian co-project leader, emphasizes that the strength of GIS lies in integrating multiple factors to solve complex environmental problems. "The tragedy — which feeds misconceptions about deforestation in Nepal — occurs when people focus on a single resource when they should be focusing on the entire system."

Arriving at solutions to curb soil degradation takes on critical meaning in Nepal. In this tiny mountain kingdom, 18 million persons live on 141,000 square kilometres — "the

most intensively used, marginalized land I know of," says Dr Schreier. The country's population doubles roughly every 25 years, putting tremendous pressure on the land to produce enough food, fodder, and fuelwood. Most people practice subsistence agriculture.

The project's research focuses on the Jhikhu Khola watershed in the Middle Mountains — Nepal's most populous region. The area suffers from intense farming, excessive grazing, and an influx of migrants during the monsoon season. These factors are causing soil erosion, sedimentation, and deforestation along with a reduction in soil fertility. The Jhikhu Khola, 40 km northeast of Nepal's capital, Kathmandu, is a typical Middle Mountain watershed whose productive red soil is prone to erosion.

The team began its study four years ago. It assembled a GIS database for the area, culling information from diverse sources. Data on the watershed's land use, forest area, topography and infrastructure came from a 1986 Land Resource Mapping Project sponsored by the Canadian International Development Agency. Aerial photos and field surveys helped provide a detailed inventory of the watershed's biological resources. Soil from the study area was analyzed and researchers set up seven hydrometric stations to measure the sedimentation process. Nepali farmers operated these stations and daily monitored climate, water loss and gain, and sediment movement.

Through interviews with farm men and women, the researchers collected information related to population, livestock, fodder and fuel consumption, crop yields and sequences, and fertilizer use. Dr Schreier notes that the data obtained from the interviews with farm women proved to be the most accurate and reliable, reflecting women's vital role in farm production.

The team also came up with estimates of the productivity, profitability, and sustainability of the different land uses and farming systems. All this information was fed into the GIS database, which will be used to develop a plan for the watershed that

will promote the most sustainable land use management practices.

GIS-based evaluations have already revealed some interesting findings. Researchers conducted an historical survey of changes in land use in Jhikhu Khola between 1947 and 1990. The survey concluded that while deforestation occurred in the 1960s, the watershed's forest cover has expanded by 10% over the past decade due to reforestation programs. Sloping terrace has increased by 9% but grazing land has shrunk by 9% and shrub land by 6%.

The research team also used GIS to calculate Nepal's supply of food, fodder, and fuelwood in 1981, based on that year's national resource statistics. Research showed that the country suffered from a 40% deficiency in animal feed while having a fuelwood surplus of 73% and a food surplus of 25%. The researchers then predicted the supply of these same resources for the year 2000. They found that the fuelwood surplus would drop to 6%. The previous surplus of food would turn into a 27% deficit and the fodder crisis would grow to a 54% deficit.

Ironically, it is Nepal's present reforestation practices that are contributing to the country's declining resources. Pine trees comprise 86% of the recently reforested land on the moderately steep slopes and lower elevations in the Jhikhu Khola watershed. Dr Schreier says that GIS evaluations have found that even though pine trees can grow at high altitudes on steep slopes, they have been planted at moderate elevations on land that should be used to raise food. Pine reforestation has also replaced the cultivation of trees that can produce animal feed and it has reduced the amount of grazing land. "From the people's point of view, it's an undesirable tree," says Dr Schreier. "Animals don't eat its needles, its fuelwood spits, and the use of pine litter in agriculture increases soil acidity which is a major threat." He adds that Nepali farmers are now forced to plant crops in acidic soils on steep hillsides at high elevations.

Assisted by GIS, researchers are developing solutions to the fodder



In Nepal, geographic information systems (GIS) technology is helping researchers find solutions to the problems of soil erosion, sedimentation and desertification.

crisis by charting a tree planting map to indicate which of Nepal's 40 fodder species grow best in different micro-climatic conditions. They are making recommendations to farmers based on this data.

While the GIS evaluations have already helped to identify ways to reduce soil degradation in Nepal, Dr Schreier emphasizes that GIS is built on assumptions — it is only as accurate as the data that researchers use to build the system.

It is also time-consuming. It took two years to train Nepalese researchers how to use various computer software programs along with GIS technology. (Dr Schreier says they learned quickly considering many had never seen computers before.) He estimates that the team will take six to seven years to implement the project in its entirety.

Consultation with local people is ongoing. Researchers hold workshops in the villages of the Jhikhu Khola watershed to keep people informed of the project's progress. They also work with village councils to introduce measures to improve the area's soil and to encourage the cultivation of marketable crops such as onion and garlic.

The project has generated many positive results, but larger problems remain to be tackled. "Nobody in the government talks to one another. The

forestry ministry doesn't share information with the agriculture ministry and this is most difficult to change," says Dr Schreier. He hopes that the use of GIS will help promote a more holistic approach to integrating the many factors affecting soil degradation in Nepal.

He feels, however, that the ultimate solution to improving the management of land resources lies in Nepal's adoption of some form of capitalistic production. "There isn't tremendous potential for increasing agricultural productivity. The land has reached its level of sustainability and there's little room to expand. I don't see any other way to maintain and sustain production if the country doesn't move into a semi-market economy."

As for the application of GIS, Dr Schreier does not want to see the technology being monopolized by the North and forced on the South. He feels that it is a good tool to promote cooperation among developing countries — he and his team are eager to share their findings with researchers in other mountainous regions of the world where there are problems with soil degradation.

"New information technologies are so very important," he says. "If you have information, you are incredibly powerful."

Deborah Carter in Ottawa.



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AVERTING DISASTER

The area around Dongting Lake in Hunan province is among the most flood-prone regions in China. Water levels often rise with surprising speed, inundating vast tracks of farmland and endangering the lives of millions of people. Over the past 150 years, silting and land reclamation have reduced the lake's size by two-thirds, making the threat of flooding even more acute.

A recently developed Geographic Information System (GIS), however, might help to avert potential disaster in the region. The system, which combines 39 million pieces of data, gives local planners access to timely information for flood damage control and management.

The information system is the result of a five-year collaboration among several Chinese research institutions, chief among them the Laboratory of

Resources and Environment Information Systems (LREIS). The project was funded by IDRC and the Chinese government.

Dongting Lake is the second largest lake in China. The region has a population of close to 7 million and encompasses a vast flood and alluvial plain. It is an agriculturally rich area with the motto "better harvests in Dongting, better life for the country."

The lake empties into the Yangtze River. When heavy rains fall simultaneously in the upper reaches of the river and in the lake area, the confluence becomes a bottleneck for mounting water. Dykes are used to control flooding but their construction cannot keep pace with the increase in flood water levels due to sedimentation — about 100 million cubic meters of sediment are deposited each year in the lake.

Flooding is a fact of life for the people of Dongting Lake. But the GIS developed for the region can help to reduce its damage. Assembled by a team of 34 people, the GIS includes data on the region's natural resources, historical and environmental evolu-

tion, population, villages, and land use.

"We've collected 15 data items for every village in the area covering its population, housing, street layout, irrigation facilities, flood control works, and so on," says Prof Chen Shupeng, the director of the project and of LREIS. "Such a database is unprecedented in China."

At the touch of a keyboard, flood-related pictures and data on Dongting Lake appear in succession on a computer screen. The system can display information on the whole area or give details on specific villages, roads, and dykes. During the heavy rains season, the latest information is gathered via satellites and airborne radar and fed into the system every four hours.

Analyses based on the combination of stored and up-to-the-minute data are sent in short intervals to the Chinese Ministry of Water Resources to serve as the basis for flood-fighting measures.

"The system can forecast floods and simulate their effect," says Dr Zhou Chenghu, a deputy director of the project. "We can see on the computer screens how many houses, roads, and fields will be submerged, how many people will have to be evacuated, and how many flood-control works will be used when the water hits a certain level. We can warn local governments of pending disasters and advise them to reinforce dykes, evacuate people, and get drainage works ready."

When a flood actually hits, he adds, the system can quickly evaluate the damage and determine which were the most effective flood-control measures. It can also help ascertain the most appropriate allocation of relief supplies.

The system had its first real test in China's 1991 flood disaster, in which an estimated 1700 people died and 650,000 homes were destroyed. Since the floods were not severe in the Dongting Lake region, the GIS was not tested to its full capacity. The system, however, was successfully applied in the Huaihe River region of Middle China and the Taihu Lake area of East China, which was struck by the biggest floods in 100 years.



The Dongting Lake area in Hunan province is among the most flood-prone in all of China. During floods, water rises as high as the vegetation on the left of this photo.



Flood control and water management help preserve China's rich rice fields.

Dr Zhou and his colleagues spent 22 intensive days building up a GIS for Taihu Lake patterned after that of Dongting Lake. "The hastily built system is simpler but it proved effective and helped a lot in damage evaluation," says Dr Zhou. The central government, for example, based its reconstruction investment on Dr Zhou's calculation that 580,000 hectares of land had been flooded instead of the previously reported one million hectares.

"The successful application of GIS technology in East China shows that it can be used extensively," says Dr Chen. Indeed, China's Ministry of Water Resources has decided to build similar systems over the next few years for 17 flood-prone areas. Most of them are located along major waterways such as the Yellow, the Pearl, the Heilongjiang and the Huaihe rivers.

LREIS, which is based in Beijing, has installed the Dongting Lake information system permanently at the Hunan Remote Sensing Centre. The move represents an important transfer of technology from China's capital to a provincial centre. "Since our system was made for the Dongting Lake area, it must be operated near the area it serves," says Dr Chen. "Its database is more easily updated there."

IDRC's involvement in GIS applications has fueled cooperation between China and other developing countries in Asia, according to Dr Chen. Chinese scientists, with IDRC's encouragement, have introduced technical know-how to Bangladesh, one of the most flood-prone countries in the world. They also expect to exchange information with their counterparts in Sri Lanka.

In addition to flood control and management, GIS also has many other potential applications. "What we have done is only the first step," says Dr Chen. "With more functions built in and an expanded database, people can use GIS to plan industrial and agricultural development and traffic construction for the entire Hunan province." He also suggests that the system will play an important role in the feasibility studies being conducted on China's controversial Three Gorges dam project on the Yangtze River. The dam is located upriver from Dongting Lake and it will undoubtedly affect the region. The GIS will help assess the dam's impact on groundwater and other local features. "The system can simulate the effects of the largest hydroelectric project in the world on the surrounding environment, thereby offering a sound scientific basis for decision-making," Dr Chen says.

LREIS is eager to expand the uses of GIS, while recognizing that there are still obstacles to be overcome. "You build a system for application," says Dr Chen, "but developing applications for an existing system is more difficult than building up a new GIS system. We've a lot of work to do in the days to come."

Zhang Dan, China Features



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DOWN TO EARTH TECHNOLOGY

A woman carrying a calabash on her head walks in the heat of the dry season in Côte d'Ivoire. Children follow her, playing along the dusty trail. They pass an abandoned well — its depths are waterless and its pump stands broken. The group walks several kilometres before reaching a dried up river bed. From a small hole, they fill the calabash with muddied water of uncertain quality and begin the long walk back to their village.

This is a common scene in northern Côte d'Ivoire and one that attests to the chronic problems with water supply



In northern Côte d'Ivoire, where many rural women walk several kilometres daily to obtain water, GIS technology is helping improve local water supply.

in the region. Solutions may lie, however, in a geographic information system (GIS) developed by Ivorian and Canadian researchers for the Marahoué River basin. The system, when applied, can help pinpoint the best possible locations for drilling wells based on an analysis of fractures in the rock beneath the earth's surface.

The GIS was put together by scientists from the Département des sciences de la terre at the Université nationale de Côte d'Ivoire in Abidjan and the Centre d'applications et de recherches en télédétection (CARTEL) of the Université de Sherbrooke in Sherbrooke, Quebec. The project was a response to both the obvious need for reliable sources of water and previous failed attempts to drill productive wells. It was one of three projects in the country that had been targeted for international support by the Ministry of Scientific Research and Higher Education.

Traditionally in northern Côte d'Ivoire, rural women collected adequate amounts of water during the rainy season. In the dry season, however, surface water is no longer available and the women would be forced to dig shallow holes to tap underground water sources. The water was often of terrible quality and caused diarrhea, dysentery, and bilharzia. Moreover, the water holes would run dry — sometimes in a matter of days.

In 1973, the Ivorian government initiated a CAD\$500 million campaign to improve the supply of water to villagers in the north. Under the auspices of the Programme national de l'hydraulique (PNH), 13,000 wells were dug between 1973 and 1985. The PNH was not a long-term success. "Unfortunately, the work was done very hastily and the wells did not produce sufficient water," says Dr Jean Biémi, a professor at the Université nationale de Côte d'Ivoire and the co-leader of the GIS project. In the Marahoué River region, 50% to 60% of the wells dug are no longer functioning. In addition to drying up, the wells were subject to mechanical breakdowns. In many cases, the taste of the water was so unpleasant that people refused to drink it.

In the wake of these failures, the government asked the earth sciences department of the Université nationale de Côte d'Ivoire to evaluate the water resources in the northern parts of the country and to determine where the PNH went wrong. The university was joined by a team from CARTEL, led by Dr Hugh Gwyn. CARTEL was chosen as a partner because of its excellent reputation in the fields of remote sensing and geographic information systems.

The research team focused on the Marahoué River basin, which is typical of dry regions in sub-Saharan countries. It gets little rain and the pre-Cambrian rock of its surface yields up little water.

Researchers spent six months building a GIS database of hydrological, geological, and geophysical information for the basin — an area of 12,000 square kilometres. Some of the data was already available, other pieces had to be collected through field work. Researchers also integrated information obtained via satellite. This remote sensing data increased GIS regional coverage and added data which would have been impossible to obtain through conventional field observations. Prior to and during the

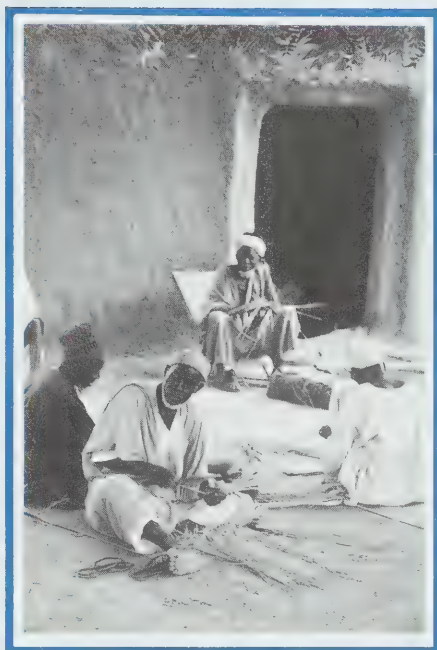
development of the GIS, training of Ivorian scientists in the use and applications of the system was ongoing.

Using GIS-based analyses, project researchers were able to determine areas in the basin where wells could be drilled successfully. They also devised a technique that related the productivity of a well to its distance from a particular set of fractures in the rock. Previously, aerial photographs alone were used to map fractures — photographs that Dr Gwyn likens to looking at a “plate of spaghetti.” Analyzing these photos using GIS eliminated useless information so that clusters of fractures could be more easily identified. The greater the density of these fractures, the greater the likelihood of finding productive sources of water.

Conventional techniques of locating wells involve an extensive geophysical analysis of each site. This is a difficult and time-consuming process — for the 13,000 wells sunk during the PNH, only 1,000 were dug on the basis of geophysical data. The combination of remote sensing and GIS rapidly isolates sites with the highest potential of producing water. Subsequent geophysical studies can thus be carried out with greater efficiency and accuracy. Dr Biémi says that roughly 100 to 200 wells can be positioned each day using GIS-assisted methods.

These same GIS techniques can be applied to finding water in other river basins in Côte d'Ivoire as well as in other countries with similar geology. These include Burkina Faso, Ghana, Mali, Niger, Senegal, and Togo. The GIS analyses also help to identify potential sources of mineral deposits. Just as water tends to collect in fracture systems, so do minerals. The Marahoué River basin is known for its concentrations of diamonds and the hydrology GIS developed for the region may aid future mineral exploration.

Last summer, researchers presented project results to a seminar of 50 senior government decision-makers in the areas of water resources, natural resource development, and the environment. There was considerable interest in applying the technology. Dr Gwyn warns, however, that GIS cannot solve all Côte d'Ivoire's water



Preserving traditional, sustainable quality of life is important for rural communities: GIS technology is helping communities find appropriate solutions to the challenges of development.

problems. Water quality is varied and pumping mechanisms often break down. Still, he sees GIS as a revolutionary tool for developing countries, one that harnesses “an incredible amount of information that can be rapidly analyzed.” He cites an example of a project in Bolivia that took three years to map the vegetation of a 2,000-square kilometre area using conventional methods. With a GIS and remote sensing, it took Gwyn and his Bolivian colleagues five days to develop a vegetation map of the same region based on remote sensing data.

He adds that a GIS does not depend on the individuals who built it to be effective. In the case of the Marahoué River basin project, the database will remain long after the geologists and their field notes have disappeared. The GIS can be added to and adapted to many other purposes.

“The information we have gathered is not only pretty,” says Dr Gwyn, “it’s pretty useful. It’s useful from the point of view of science and technology as well as providing a useful tool for development.”

Jennifer Pepall in Ottawa



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A USER'S GUIDE TO GIS

Geographic Information Systems (GIS) technology is not a tool for doing business as usual; it could revolutionize the management of human and material resources in the developing world. To realize its benefits, individuals and institutions must be open to change in the ways they collect, process, handle, and disseminate information. They must be willing to rethink the purpose and structure of their organizations. For those that are innovative and capable of mastering the technology, the potential of GIS is virtually limitless.

GIS technology, however, is widely misunderstood in the developing world. Exposure to GIS is frequently limited to dated technical journals or the occasional visit from a travelling sales agent peddling computer equipment. Moreover, individuals in the South charged with introducing GIS often overestimate their organizations' readiness to use the technology and underestimate the time and effort needed for its successful and sustainable implementation. The same is true for international GIS consultants, who rarely have prior experience with adapting the technology to conditions in the developing world.

What must a developing nation know to set up a GIS successfully? Practically, a geographical information system is nothing more than a set of software tools designed for managing, analyzing, and displaying the contents of a database. The data is geocoded, meaning that selected elements are assigned unique identifiers that relate to their physical location on the earth's surface. In the case of Egypt's Water Resource Management GIS (WRMGIS), data that has been geocoded includes the location of rivers, roads, bridges, wells, and irrigation systems.

A knowledge of mapping, and to a lesser extent of surveying, is required to use GIS successfully. It is more important, however, to have a thorough knowledge of the task to which GIS technology will be applied. An in-depth understanding of irrigation management in Egypt was essential to the development of the system for WRMGIS.

The more expensive the system, the more complex the toolkit. Top-of-the-line GIS software is not for novices unless they have the time and money to become experts. Not every organization needs a deluxe GIS. For most, it makes sense to start with a simple system and develop staff expertise slowly and deliberately.

The successful implementation of GIS depends almost completely on the availability of people with a suitable educational background and practical skills who are interested in learning the technology. As few developing countries have a large pool of personnel who meet these requirements, the experts chosen to introduce GIS systems must provide appropriate training. (See box)

Anyone who has worked in a bureaucracy knows that the control

of information is the ultimate source of power. Government agencies in developing countries are highly bureaucratic and centralized. Any system that changes the approach to information collection, management, and dissemination will immediately be seen as a threat to the entrenched power holders.

As a result, GIS consultants working in developing countries frequently find their access to information barred or at least made very difficult and time-consuming. The task of introducing GIS technology to a developing nation is not for one who is easily frustrated or short on patience.

Conversely, implementing organizations must recognize that bureaucratic delays cost money. They must be prepared to run interference for their consultants by aggressively attacking organizational barriers and inertia. If they are not prepared to do so, they should abandon the idea of using GIS.

Although it is by no means a panacea for all that ails a developing country, prudently implemented, GIS technology offers a forward-looking nation many potential benefits. For example, a number of demonstration projects in Egypt have conclusively



In Egypt, new GIS technology is used in conjunction with traditional methods to help improve the management of water and other resources.

TIPS ON TRAINING

In assessing the qualifications of GIS consultants, agencies should pay close attention to proposed training programs. Consider the following:

- Does the program provide off-shore instruction for a few promising trainees? The long-range sustainability of a national GIS program needs people with advanced academic training.
- Has a provision been made for upgrading the skills of trainers? A GIS project must have the capability to train personnel as the need arises.
- Are the objectives of the training plan clearly spelled out? Are they realistic given your staff's current level of expertise? Be honest with yourself. Don't let personal or organizational pride cloud your judgement. You are far more likely to overestimate rather than underestimate the capability of your staff.
- Are the costs reasonable and can you afford them? Good training takes time and it is not cheap. New users of GIS technology grossly underestimate the time required to attain even a modest level in proficiency. Ten to 15% of your budget is not too much to spend on training.

In addition to training staff in the rudiments of GIS, a consultant must stress the importance of defining the

tasks for which the technology is being used. Management and users should participate in this definition process. To assist their clients, consultants should be able to address the following issues:

- A working GIS should be demonstrated. It does not have to be complex nor does it have to cover the specific applications of the implementing agency (although this would be more effective). It should be complete enough to enable potential users to imagine how they and their organization might profit from the introduction of GIS. Moreover, the inherent capability of all geographical information systems to respond to such routine inquiries as "how many (roads, bridges, trees, schools etc.) are within a certain area?" is frequently not understood or greeted with scepticism. A brief exposure to a working GIS will help beginners understand the technology's capabilities.
- GIS technology has introduced a new variable to information management — location. It makes possible the formulation of "what if" questions relating to the placement and movement of physical objects. Consultants should be prepared to explain and demonstrate this capability to potential users before asking them to define their requirements.

shown how geographical information systems could improve the country's ability to manage its land, water, and agricultural resources. GIS can help plan the scheduling of irrigation, assess the impact of pesticides on water quality, and determine the best places to plant rice. There is little doubt in the minds of those associated with these projects that GIS is a technical necessity for Egypt and its application should proceed immediately throughout a number of ministries.

Unfortunately, the wholesale implementation of GIS will cost millions of Egyptian pounds — money that is not available now nor in the foreseeable future. From a political and financial perspective, GIS technology is a luxury and will likely remain so for years. What then is Egypt to do?

At present, it must continue to rely on such organizations as IDRC, the German Agency for Technical Cooperation, and US Agency for International

Development to fund the development of GIS. Until now, these agencies have only been willing to finance demonstration projects. If GIS technology is to be introduced on a large scale, a way must be found to convince international development organizations that it is in Egypt's — and their — best interests to recognize that GIS is not a luxury but a necessity.

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A SYSTEM FOR PLANNING AHEAD

The potential use of Geographic Information Systems (GIS) for planning in India is enormous, given the large size of the country and the centralized nature of the decision-making process. The need for comprehensive repositories of data that can be integrated and analyzed together is essential.

Among the best known GIS projects in India is the Natural Resources Database and Management System, supported by the Department of Science and Technology. A number of other government agencies have also used GIS, but most have focused on forestry, water resources, and wastelands.

Another GIS in India — the Bihar information system — is somewhat different. It is the only large GIS in the country that is not financially supported by the government directly or by any of its agencies. As such, access is not confined to government users; information generated by the Bihar GIS is open to anyone with an interest in the state.

Funded by IDRC, it is based at an undergraduate college. It has a staff of three — one faculty member and two research assistants. It is mainly concerned with producing spatial information of use to planners and administrators. Its databases therefore feature only a few “natural physical” items. Most of the data is concerned with physical infrastructure and with demographic, social, and economic features.

The Bihar GIS shows how an information system can help planners make space-related decisions. These may be simple exercises that involve the calculation of distances and areas or they could be more complex analyses that incorporate several variables. In some cases, planning decisions may prove impossible to make without a GIS. The following few examples illustrate the system's varied functions.



GIS can integrate data from maps of different scales and even from satellite images to get a picture of the area under study.

Many children in Bihar, especially girls, are illiterate. The Bihar GIS, using data on enrolment and the number of schools, can identify districts where the ratio of boys' to girls' schools is greater than ten to one. Using this yardstick, the education department can determine which districts most urgently require girls' schools.

Rural services in Bihar are limited and highly localized. The GIS shows that villages that are not connected by paved roads are seldom chosen as locations for new services. Conversely, villages with better access to communication systems become enclaves of isolated development by being repeatedly selected as service centres. For example, bank branches in one district are always located within five kilometres of paved roads and railways. Rural telephone exchanges in another district are only found in villages linked by paved roads.

Similarly, development bypasses many towns that are not part of a regional communications network. GIS techniques can establish which

towns are poorly connected by locating all those that are not within five kilometres of a paved highway or railway station. One-tenth of the towns in Bihar fall into this category. Planners can employ this GIS-generated information constructively to ensure balanced regional development.

A final example of how GIS can be used for planning in Bihar relates to India's New Industrial Policy of 1991. The policy states that new manufacturing units cannot be located within 10 kilometres of cities with more than 100,000 inhabitants. There is only one city in Bihar, along with its satellite towns and urban outgrowths, that has a population of 100,000. The GIS helped delineate the city's outer limit and defined the 10-kilometre zone from which new industrial units were excluded.

Although the Bihar GIS illustrates the many functions of an information system, it is also useful to highlight some of the capabilities of a GIS applied on a wider scale. Planners often require that one set of data be overlaid with another in order to find associations between variables. They

also need to identify patterns and exceptional situations. For example, a planner may wish to see whether poor hygiene conditions and inadequate drainage are associated with areas infected by a particular disease. But in many parts of India, maps are not available on a uniform scale. Under these circumstances, a GIS can integrate data from maps of different scales and even from satellite images to get a picture of the area under study.

GIS is not only important in the process of spatial planning but also at the level of monitoring and physically evaluating development programs. In India, such evaluations are usually done on the basis of financial allocations and expenditures. A GIS could incorporate factors such as the creation of physical assets and their maintenance into evaluation procedures.

More specifically, a GIS can help study the effectiveness of the public distribution system for subsidized grains, sugar, cooking oil, and kerosene. These commodities are distributed through "fair price ration" shops, which are found in villages and towns throughout the country. A large section of the population cannot afford to pay full-market prices so the smooth flow of subsidized goods to these shops, which number in the millions, is essential. A GIS provides a good way to regulate the flow of these commodities from warehouses to retail ration shops. By identifying shops where there is a greater or reduced demand for particular goods, prompt delivery and better availability of goods can be assured.

Geographic information systems are clearly valuable tools for planners and administrators. But widespread use of the technology in India faces several

obstacles. The process of establishing the Bihar GIS serves to highlight some of these difficulties along with certain characteristics of the information environment in India. These findings are as important as the results derived from the analysis of data on Bihar.

Much stress is placed on developing and acquiring GIS hardware and software in India. The equipment and software packages are generally imported and they are expensive. This is a major problem in a country where import duties are high and access to foreign currency is restricted. Moreover, replacement of hardware parts can take months because few servicing agents stock components.

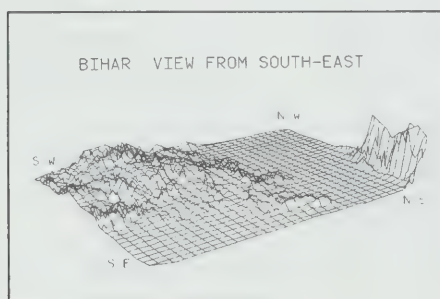
It is recognized that these factors discourage the adoption of GIS in India. Less emphasis, however, is placed on the importance of developing technical skills and databases. There is a dearth of skilled GIS technicians in India today and there are few people who can advise on the various aspects of setting up a GIS. If the technology is ever to be widely used in decision-making, databases will have to be developed in a systematic manner. This is laborious and time-consuming and it requires special abilities and equipment. It is therefore urgent that greater priority be given to training GIS technicians.

A vast amount of information exists in India today but there is no culture of using it to support spatial decision-making. This paradoxical situation is partly the result of government control of map data. In India, the greatest deterrent to the development of GIS databases is the government's restriction of access to maps. Much of the data is also outdated. But as agencies computerize the process of map production, new databases will be created. Perhaps this development will provide an opportunity to guarantee access to all interested parties, including non-governmental organizations, to these databases.

Many people who could profit greatly by the use of GIS in their work are completely unaware of the technology. The highest priority should be given to exposing potential users to GIS data and to the strengths of GIS tools and techniques. There is also a need for an institution or resource

group that can give information on how to establish a GIS. Only by addressing these concerns will GIS be given its rightful place in India's planning and development process.

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A NEW FAMILY PLANNING TOOL TO SLOW POPULATION GROWTH

A safe, long-lasting, and reversible vaccine developed in India is poised to revolutionize family planning.

In New Delhi, India, a group of young women are among the volunteers working to slow the advance of world population growth. These women — teachers, nurses, and secretaries — have volunteered at two hospitals to participate in trials of a revolutionary birth control vaccine. The women are between the ages of 20 and 36 and are of proven fertility, having completed their families with at least two children. This group is proving that a shot in the arm with 300 micrograms of vaccine is an ideal contraceptive and one which could be part of the solution to check the world's spiralling population growth.

The vaccine is the result of research begun in 1975 by Dr Gursaran Talwar, Director of India's prestigious National Institute of Immunology. IDRC has given Dr Talwar CAD\$4.5 million for research over 17 years. He also receives funds from the Government of India.

The vaccine works by "convincing" a woman's body that all is unchanged when, in fact, an egg has been fertilized. After conception occurs, a woman produces a hormone called human chorionic gonadotrophin (hCG) that helps to prepare the uterus for pregnancy. The prototype vaccine, made from hCG coupled to a biochemical carrier, neutralizes hCG by stimulating antibodies against the hormone. Without hCG the embryo cannot anchor in the uterus, making pregnancy impossible. The biochemical carrier makes the hCG immunologically visible to women's immune system.

"What you're basically doing is interpreting the signal that tells the mom's body to set up the whole uterine environment for pregnancy," says Dr Talwar. "And if that [signal] doesn't happen, then you're not going to get a pregnancy."

In the vaccine's prototype version, immunization begins with a series of three injections given at six-week intervals. After the last shot, the woman is protected for a year. If she wants continued protection, all that is needed for the next year is a single booster. If the woman wants to have a child, she just has to stop the injections and the hormone will no longer be neutralized.

The latest clinical studies of the vaccine resulted in only one pregnancy in 88 women observed over 821 menstrual cycles. The time each woman has been on the vaccine varies

from six months to two years. Theoretically, 821 cycles without contraception in different women would have resulted in 250 to 300 pregnancies.

"We have passed an important milestone and that is to confirm the vaccine works," says Dr Talwar. "This is the first time we've seen a birth control vaccine that can prevent pregnancy in humans."

Despite this success, however, it will be some time before the vaccine is ready for the public. Vaccines for use in healthy people take a long time to be approved. "My hope is that before the decade ends it will be available for public use," says Dr Talwar.

Clear advantages make the vaccine an appealing alternative to other family planning methods. It is reversible and it lasts for one year. Most importantly, it does not disturb a woman's physiology. The vaccine does not stop ovulation or alter the menstrual cycle. It avoids having to take a drug every day, as in the case of the birth control pill, or undergoing an operation and experiencing the irregular bleeding associated with IUDs. Even new devices such as Norplant, a steroid pack implanted in a woman's arm, cause irregular bleeding.

Other characteristics make the vaccine particularly appropriate for use in the developing world. It requires neither the logistics nor the facilities needed to administer conventional types of birth control. It is also less intrusive, a potentially important factor in countries that have cultural taboos against contraception.

Dr Don de Savigny, a program officer with IDRC's Health Sciences Division, says the vaccine gives women a subtle way of at least spacing their births if not reducing the burden placed on them by tradition and culture. "Ninety-nine percent of global maternal deaths occur in developing countries. This vaccine can help alleviate the problem of insufficient spacing as one of the reasons." In addition, women with many children close in age cannot give the care and attention each requires.

Dr Talwar emphasizes that the vaccine is not an anti-conceptive. The hormone intervention acts after conception, but prior to embryo implantation and before pregnancy can be established. Even without the vaccine fertilization takes place all the time in the body without a pregnancy taking place.

"Nearly 75 percent of embryos are normally lost at this stage. The vaccine simply increases this incidence to near 100 percent."



A newly developed vaccine holds the promise of a safe yet unobtrusive family planning method.

UNIVERSAL APPEAL

The vaccine's use will not be limited to developing countries. "Many people want alternatives to current methods of contraception. Human reproduction is a universal phenomenon. There is no dividing line between North and South," says Dr Talwar.

It is no surprise, however, that the vaccine was developed in India. With a rapidly increasing population of 876 million, the government has placed a high priority on finding a safe, easy-to-use, and effective method of birth control. Current rates of growth predict India's population will exceed that of China — currently the world's most populous country — within six decades. India's objective is to attain zero population growth by the year 2050 with a population of 1.3 billion.

In 1950, India was the first country to launch a family planning program. Since then, India has acquired a reputation for its innovative ideas and for providing a testing ground for new methods of birth control. The vaccine, if approved, will become a cornerstone in India's goal of establishing the two-child family.

SKEPTICS

Although the vaccine's success is evident, not everyone was convinced of its feasibility. Dr Talwar vividly describes the disbelief and skepticism that greeted his proposal in the early 1970s. "People felt that it was a fantasy. Vaccines were traditionally made for diseases, pestilence, viruses and bacteria — not birth control." If researchers did not dismiss the concept as a fantasy, they said it would not be safe or reversible and that it would weaken the immune system.

To refute these claims, Dr Talwar and his team subjected the vaccine to long, exhaustive toxicology studies and numerous clinical trials on animals before moving on to human testing. The vaccine trials also underwent ethical reviews to ensure that the vaccine is reversible, non-toxic, and not a barrier to ovulation or menstruation. Independent studies have confirmed Dr Talwar's results. The International Committee for Contraceptive Research of the Population Council in New York, has conducted its own toxicology studies on the vaccine in Brazil, Chile, Finland, and Sweden.

"For a scientist in a developing country to make an original contribution, he or she has to work five times harder," says Dr Talwar.

Indeed, some of the best scientific research institutions in the world are in India, says Dr de Savigny. "Talwar's National Institute of Immunology is a world class institution. Immunologists come from all over the world to work and study there." In fact, birth control vaccines being developed in Australia and the United States are not as advanced as Dr Talwar's vaccine.

A MALE VACCINE

India's population explosion is exacerbated by Hindu religious beliefs preventing the slaughter of cattle. As a result, people compete for precious space with 297 million cows. Indian researcher Dr Gursaran Talwar developed a vaccine for bulls rendering their semen free of sperm. The vaccine leaves the bull's libido intact and is irreversible. Possible spin-offs did not go unnoticed.

A human version of such a vaccine could be the overdue answer for a long lasting male contraceptive. Dr Talwar is developing a reversible contraceptive made from a purified extract of the neem tree called 'praneem'.

Like the vaccine for bulls the vaccine for men renders semen free of sperm. It does not disturb the male libido or hormone levels and has resulted in no side effects.

Through all this, Dr Talwar credits IDRC with making his research possible. "IDRC had the courage to pick up this venture," he says. The Centre's continued support since 1974 allowed Dr Talwar to obtain results which attracted the attention of other groups.

UNFINISHED BUSINESS

Dr Talwar is currently working on a compatible, safe and effective method of birth control to protect women during the three month period when they are receiving the shots. At present, women in the trial are using IUDs or barrier methods.

The purified extract of the neem tree is where Dr Talwar expects to find his solution. Called praneem, the substance has prevented pregnancy in rats and monkeys for three months after being injected into the uterus. Like the vaccine, praneem does not interfere with ovulation or menstruation.

IDRC has been able to foster North-South relations in this area. In Canada, researchers at the University of Alberta are collaborating on the neem studies to establish why and how the neem oil acts as a contraceptive.

Another problem to be solved is how to administer the birth control vaccine. Work is under way to create a delivery system so that women only have to visit a family planning service once instead of three times. A biodegradable



FROM PLANT TO POISON

implant which contains and secretes the necessary dosage for one year is being designed. Dr Talwar is also working on a version of the vaccine that will last two years.

As with all vaccines, there is a percentage of the population that will not produce enough antibodies when immunized. Accordingly, Dr Talwar is developing an inexpensive, finger-prick test which will indicate whether a woman is making enough antibodies.

Once these technical problems are solved, other questions remain. The introduction of such a revolutionary concept in family planning opens up a whole new arena of socio-cultural and health system issues.

The vaccine's impressive results so far are an encouragement to all those working to give women better control of their reproductive capacities, but as Dr Talwar states, although "the light is green, there is still a lot more to do before we reach the end."

Peter Newton in Ottawa

Fish and shrimp farmers throughout the world stand to profit from the discovery of an environmentally friendly and cheap fish poison (piscicide) to be used in the battle against unwanted predators.

The poison, called Swimtop, is the product of a seven-year research effort involving scientists from Chiang Mai University and the Prince of Songkla University in Thailand and the University of British Columbia (UBC) and the University of Ottawa in Canada. IDRC funded the project.

Natural predators, such as eels, mullet, sea bass, and tilapia, can account for up to 40% of the losses in the commercial fish and shrimp harvest in Thailand. Producers battle this problem by using cyanide — a poison that can have a serious impact on all organisms in the food chain, including humans. Many fish and shrimp farmers also use tea seed cake, which is the traditional means of controlling predators in Thai aquaculture.

About CAD\$2 million worth of tea seed cake is used annually in Thailand. Most of it is imported from China due to insufficient local production. In the cultivation of commercial tea, the plant's terminal shoots are cut off so that flowers and fruits are unable to develop. This practice means that there is not enough tea seed in Thailand to use as an aquacultural piscicide.

"Our goal was to find an ecologically acceptable alternative to tea seed and also one that was in good supply," says Prof Pichaet Wiriyaichitra, a professor of chemistry at the Research Centre of Natural Products at Chiang Mai University and the project leader.

Dr Neil Towers, a botanist at UBC, assisted Thai scientists in the collection and screening of plant species. More than 250 species were initially tested to assess their potential use as fish poison. Many were highly toxic to predatory fish but were ruled out because they were in short supply. Some proved so poisonous that they were unsafe to handle. Scientists carried out the testing in Thailand and at UBC.



In an effort to preserve Thailand's commercial fish and shrimp harvest, compounds from a shrub called Maesea ramentacea are used to kill unwanted predatory fish — without harming other organisms in the food chain.



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REPORTS



After being soaked in water for two hours, the piscicide is spread over shrimp ponds. The substance leaves no toxic residue.

Five plants were ultimately chosen for field testing on shrimp farms. Researchers extracted powders from the plants and dried leaf preparations and experimented with different methods of applying them as piscicides. They assessed fish mortality by species along with yields and economic returns. Their findings were compared to the results of using tea seed as a fish poison.

A fast-growing shrub called *Maessea ramentacea* was the final plant to be selected for further testing and evaluation. "One of our biggest challenges was trying to determine the active ingredient of the plant," says Prof Pichaet. It took a lot of investigation to learn the structure of the chemical compound of the plant." The detective work revealed that the plant's key active ingredient was saponin, which selectively kills fish without affecting other organisms in the water.

Dubbed Swimtop by researchers, the piscicide is made by drying and crushing the leaves of the *Maessea ramentacea* shrub. The resulting powder is packaged in small envelopes resembling tea bags and then suspended on the water's surface. The piscicide, absorbed through a fish's gills, breaks down red blood cells. The fish is thus deprived of oxygen and dies. Shrimp remain unaffected

because they are physiologically different from fish.

Only a small quantity of leaves is required to kill fish (20g of dry leaf powder per ton of water). At doses lower than this, Swimtop temporarily stuns the fish, making them easier to harvest. In one field trial in the village of Korat, the fish were even caught with bare hands.

The piscicide is currently undergoing tests to determine its effects on humans and other mammals. The analysis is being done according to the OECD Guidelines for the Testing of Chemicals. Dr Sam Kacew of the Department of Pharmacology at the University of Ottawa, is supervising these tests. He says the early studies show that in high concentrations, Swimtop has no apparent toxic effect on mammals.

The piscicide has been well received by shrimp and fish farmers. It is inexpensive and the plant from which it is derived is easily available and can be mass cultivated. "You can take a cutting, stick it in the ground and it will grow into a tree," says Towers. Moreover, it leaves no toxic residue so the fish can be eaten without harm. Swimtop also breaks down quickly so treated ponds can be restocked with fish within 72 hours.

Researchers have applied for patents in both Thailand and Canada. They have also prepared a business plan and have held preliminary discussions with several companies about the commercial manufacture of Swimtop. If successful, seven years of research into an effective piscicide may lead to profits.

Ron Stanaitis in Thailand



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STUDENT AUTHORS

The little boy, one of a hundred children in the class, stood confidently and looked his teacher in the eye before reading:

**Lovely is he, fat is he.
Beautiful you are, good you are.
Nice and beautiful, brown is she.
I love my teacher,
she is a nice teacher.
Lovely you are. Nicely you are.**

The delight was not that eight-year-old Sabra Kasozi was so fond of his teachers, or even that he could read so clearly what he had written, but that he was so confident in standing and announcing his skill.

Sabra is one of almost 5,000 Ugandan children who are learning a love for reading and writing through the IDRC-funded MINDSACROSS literacy project. Children at the four participating schools are encouraged to write poems and stories that, instead of staying in their exercise books, could be published in small volumes for circulation throughout the school system.

"There's a dearth of reading materials in schools here, especially for children," says Senteza Kajubi, vice-chancellor of Kampala's Makerere University and one of the founders of the MINDSACROSS project. "Books that children read at home — if they have books — are usually British Ladybird books that show unfamiliar

things. We feel that the idea of a book written abroad and brought here should be dispelled. Pupils can write books themselves and so fight the hunger and thirst that there is in this country for reading materials.

"When children write," Kajubi adds, they are often writing for the teacher and it's not spontaneous. MINDSACROSS is children writing for each other."

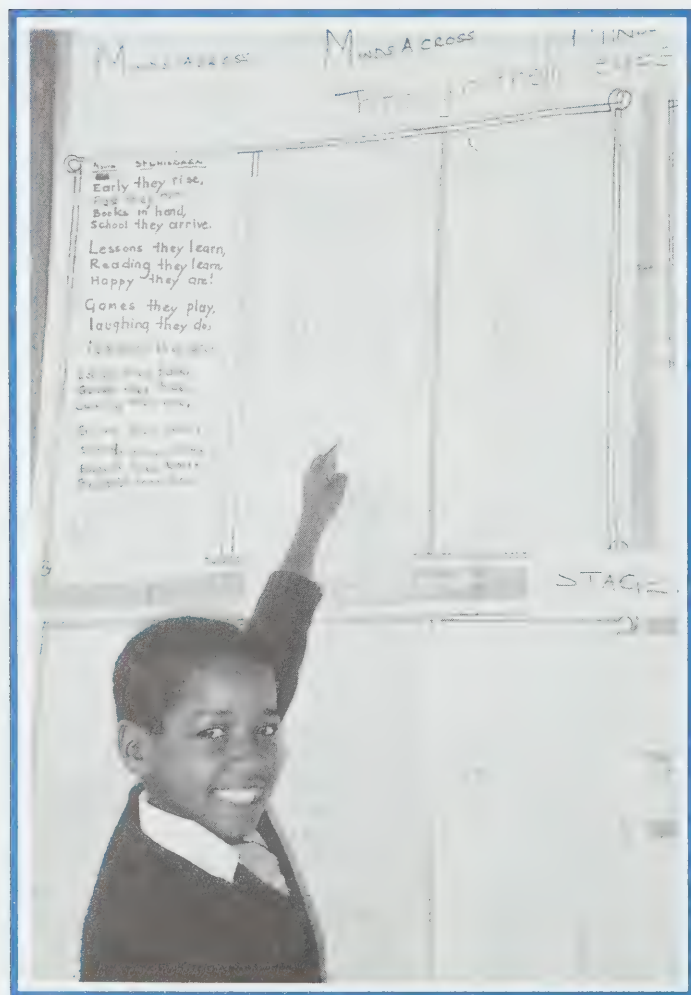
SIMPLE IDEA

It is a simple concept — make writing fun, then share it by making it available for others to read. The problem is that Uganda is still recovering from two decades of repression under former dictators Idi Amin and Milton Obote. Schools are impoverished and lack basic supplies. For the sake of some paper and pencils, the country's next generation is struggling with literacy.

Teacher Joshua Lwanga Ssentongo knows what the lack of materials means. "I learned the hard way, I think," he recalls. "There was no encouragement for creative writing; everything was written and recited off the blackboard. After we read the phrases, which were often the same, they were wiped away. As a teacher now, I know that is no way to learn effectively."

At the Kitante Primary School (motto: "the struggle continues for greater horizons"), the 2,000 children are each given a sheet of paper in class and assigned a writing project, such as a poem or essay. After that work has been marked by their teacher, it is pinned to a notice board at the back of a class. Sometimes it will be read out at the school's Friday assembly. If it is very good, it will be pinned to the MINDSACROSS board beside Principal A. D. Sozi's office.

After the work has been displayed, the paper is pasted onto a larger sheet that can be rolled up and used as a scroll-like book. Or, it can be strung into a thin sheaf of similar poems and stories and placed in the class library. A MINDSACROSS worker can then take the slim volumes and, using a basic desktop publishing computer and software, publish them for cheap distribution around area schools.



A proud author and his work: Sabra Kasozi may see his poem move from class bulletin board to published text, encouraging other young Ugandans to write, write, write.

PROUD PUPILS

"If children write something that is reproduced in a book, it gives them something to be proud of, to give them self-worth," says Kajubi. "They go to their parents and say 'Mummy, Daddy, have you seen my book?' That can never happen for a child who can only read words from a blackboard."

Even such basic teaching methods are a luxury in Uganda, where there is no free primary and secondary schooling. There is no reliable estimate of the country's literacy rate; Kajubi guesses that it is probably about 50 or 60% and less than that for women. Only 60% of Ugandan children attend primary school, and only one of three progress to secondary school; parents cannot afford the expense.

The government of President Yoweri Museveni has pledged to introduce free education by the year 2003, but little has been done so far and critics feel the date is unrealistic. Spending on primary school education is still only 0.01% of Uganda's national budget and parents must pay teachers extra money to help them survive. Teachers at Kitante have a government salary of 10,000 shillings a month (US\$10.00), which is supplemented by 24,000 shillings (\$24.00) by parents.

The cooperation of the parents is essential to the success of MINDSACROSS. "This is one of the best primary schools in the country," says Edward Kasibante, who has three of his four children attending Kitante. "We used to have them learn by charts on the blackboard, with letters and numbers, but here they are given books."

Those photocopied books, when they are available, cost only about 300 shillings (US\$30 cents) each. Uganda's inflation means that the price has doubled in the last two years, but it is still far cheaper than a textbook, which costs at least 5,000 shillings (\$5.00). Unfortunately, limited funds mean that only a few editions of each MINDSACROSS book can be printed. And now, there is not enough money to publish even this small number. IDRC gave more than \$150,000 between 1988 and 1990 to establish the program but Kajubi must find more funding to continue the sup-



Promoting literacy and a love of books: student Stephen Sekayombya's creativity is reflected in a map of Kampala and descriptive text.

ply of such basic materials as paper, pencils, cardboard, and paste in the schools. And although space is available at the university for an office and a computer, someone must be paid to gather the stories and poems and create the books. For now, the students' creative output is being pasted on the school walls and stored in envelopes.

FUTURE PROMISE

These envelopes might hold the promise of something remarkable. "If these children's achievements are followed up in secondary school, we might find we get some great Ugandan authors at last," says Kajubi. "We've produced very few, not like Kenya or West Africa, and yet the talent is there."

The Kitante primary school has swelled from 800 pupils in 1979 to its current overcrowded classrooms, which house 2,000 students. Only one-third of the children who apply for spaces are accepted, and MINDSACROSS is one of the reasons that the school is so popular. Principal Sozi hopes the project will spread to schools across the country, but for now, the priority is to supply teachers and classrooms.

"It's very, very bad," he says. "We lose so many talents all along the line, but we need very many more schools at all levels. We need to teach practical things — at the moment, for

example, at this school we have no laboratory and we can only talk about science. It's all just so frustrating. While people are going to the moon, we cannot even make a pin. Not yet."

Kajubi shares the principal's frustration, for he can also see the children's potential. But he smiles when he recalls the hope expressed in the most popular of the more than 100 MINDSACROSS titles.

In 1989, 2,000 copies were printed of *War on Poverty, Ignorance and Disease*, compiled from the poems of pupils from the Kampala Parents Primary School. It gave an opportunity for 14 children to share their views with thousands of others. Twelve-year-old Peter Kamugasa's poem, half-way through the cardboard-bound book, is typical:

Let's gather and make a weapon
A strong weapon against disease
A weapon that is undisputable
And unbeatable the weapon must be
To defeat the dreadful diseases
The weapon is knowledge.

Mark Richardson in Uganda



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FAST FORWARD TO DEVELOPMENT

Malaysians from the prime minister down to the smallest primary school pupil are part of an ambitious strategy to turn their country into a developed nation over the course of a single generation. The plan, called Vision 2020, sees Malaysia as an affluent nation, advanced economically, socially, and culturally by the year 2020.

The rapid growth of the manufacturing sector is fueling Malaysia's progress toward this goal. In the last two decades, manufacturing's share of the Gross Domestic Product (GDP) doubled to 27%, displacing the contribution of the agricultural sector—the traditional base of the country's economy. But while this shift of economic emphasis is welcomed, it has exposed weaknesses in Malaysian industry.

"Our industries have been highly production-oriented, with very little technology added on in the manufacturing process," says scientist Dr Hamzah Kassim, the Director of the Corporate Affairs Division in the government-run Standards and Industrial Research Institute of Malaysia (SIRIM).

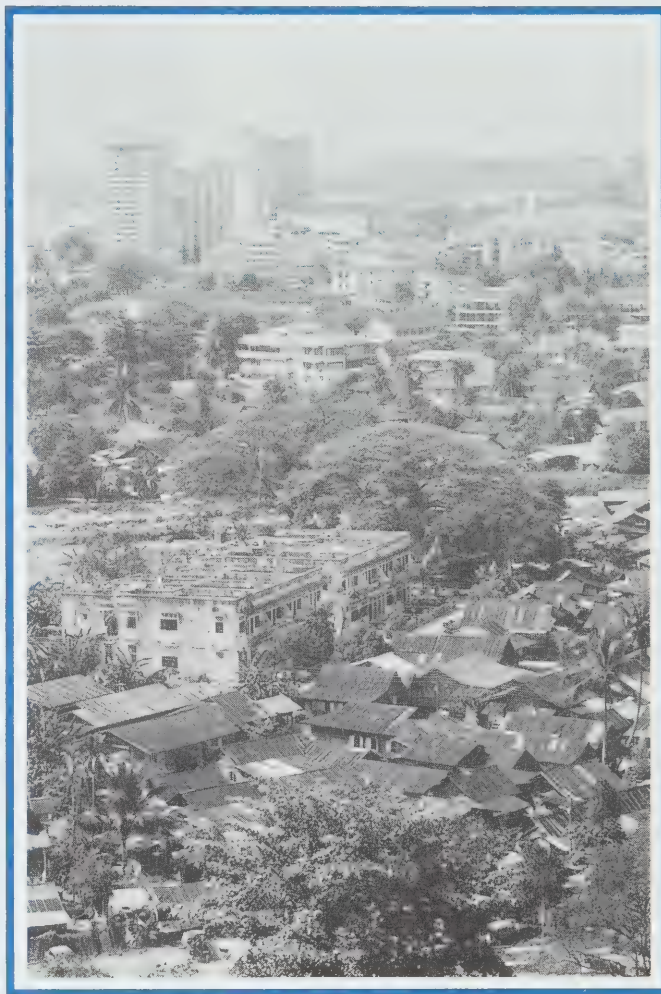
Manufacturers have been spending huge sums of money to import technology without considering how they could develop it themselves. The current annual expenditure on research and development (R&D) is a mere 0.8% of GDP with 90% of the funds coming from the government.

Recognizing Malaysia's need to become more technologically competitive, the government appointed a committee in 1987 to draw up a plan for industrial technology development. IDRC helped fund the initiative. During the next two years, what began as a small project grew into a major enterprise. The committee consulted hundreds of people from government, academia, and the private sector and commissioned 29 studies. The committee involved organizations and agencies in consensus-building exercises about the role of science and technology in the Malaysian economy. Drafts of the plan were reviewed and discussed so as to include all relevant views and ideas. By 1990, these were distilled into the committee's Action Plan for Industrial Technology Development.

PLAN ADOPTED

Government reaction to the committee's report was swift; it adopted all 42 of the plan's recommendations and incorporated its suggestions into the country's five-year development plan. Some ministries began to implement the recommendations immediately. "Very few projects have been so readily and quickly accepted by the government," says Dr Hamzah, who was the research director in the committee's Technical Secretariat. Soon afterwards, the government announced its Vision 2020 strategy.

Process played an important role in enhancing the Action Plan's impact. "The task of drawing up the plan itself created an awareness of the importance of technology that will drive our industrialization process," says Dr Hamzah. This awareness was reinforced by the establishment of a national research consortium. In setting up the consortium, the committee pulled together researchers and practitioners



Since early 1970s, the manufacturing industry has been growing rapidly in Malaysia — with much of the activity taking place in the capital, Kuala Lumpur.

from all sectors of the population — from decision-makers to direct users of technology. "The consortium was set up to mobilize national expertise, to build a supportive national consensus, and to create experts on issues pertaining to technology development and technology policy," says Dr Hamzah.

The task of building awareness continued right through to the final round of discussions. A large group of representatives from both public and private sector organizations reviewed the draft of the Action Plan. This helped to instill the ideals and aspirations underlying the plan among those working in science and technology issues, policy, planning, and implementation. "It is easier for people to commit more money to science and technology when they understand what it is all about," says Dr Hamzah.

The Action Plan contains five strategies, labelled "strategic thrusts", that list the requirements for Malaysia's technological development:

Leadership

The plan recognizes that government leadership must be focused on strengthening Malaysia's science and technology infrastructure. Accordingly, the plan recommends that a permanent Cabinet Committee on Science and Technology be set up, headed by the prime minister. The committee would ensure that government ministries and agencies give science and technology issues sufficient priority.

The plan places much emphasis on the creation of a favourable environment for the growth of research and development. For example, it recommends that R&D institutes be given greater financial autonomy so as to speed up the decision-making process and to tie programs more closely to performance.

R&D and the Private Sector

R&D must be more market-driven. "For maximum effectiveness, the private sector has to be encouraged to take a long-term view of business ventures through investments in R&D and the research community has to re-orient its activities in line with industry needs," says the report. It calls for private sector funding of R&D to increase to 60% (instead of the current 10%). The government could offer incentives to encourage greater private sector investment in R&D, such as lowering or abolishing tariffs on essential R&D equipment. The plan envisions that R&D spending should be at least 1.5% of the GDP by 1995 and 2% by 2000.

In Malaysia's 1991-1995 development plan, the government doubled its allocation for R&D to 1.16 billion ringgit (US\$430 million). The country's 1991 budget also incorporated many of the plan's suggested incentives for R&D. These included a five-year tax exemption for companies undertaking research for a particular industry, tax exemptions for dividends distributed by these companies and a five-year tax exemption for new technology-based firms.

Emerging Technologies

Competence in new technologies is essential to building a competitive industrial economy. The plan recommends that Malaysia develop greater expertise in five key areas: automated manufacturing, advanced materials, electronics, biotechnology, and information technology.

Human Resources

A trained, technically proficient workforce is required to develop and sustain a successful industrial economy. Among other measures, the plan suggests that the government set up a Skills Development Fund to finance industry training programs. The fund would be jointly managed by the private sector and the government. In addition, adult and continuing education programs should be expanded, particularly in technical subjects.

The government should also ensure that Malaysian graduates of overseas universities have acquired skills and training that are appropriate to the nation's needs.

Science and Technology Culture

The last of the plan's strategic thrusts calls for the creation of an environment in which science and technology can flourish. Since technology exists to serve society, the report reasons that Malaysian society must become more knowl-

edgeable about technological issues. "Science and technology awareness should be pervasive, permeating all levels of society, and all sectors of activity." The educational system and the mass media are important means to inculcate this awareness. In addition, the plan urges the creation of a Science Centre of international stature and the expansion of the country's Science and Technology Week.

FRIENDLY GADGETS

At the very least, this emphasis on popular education will make Malaysians more technologically literate. "We want to create a strong science and technology culture so that people will not have a fear of electronic gadgets. These are friendly things," says Dr Hamzah. More importantly, however, the full participation of Malaysian society is critical to the country's industrial development. The Action Plan sees Malaysian society as sharing responsibility with government, the research community, and the private sector for making the country economically competitive in the 21st century.

The plan's recommendations have already attracted funding from the World Bank and the Asian Development Bank. Several Canadian companies and organizations have also made bids to implement sections of the plan.

In seeking to reverse Malaysia's economic and technological dependence in 30 years, Vision 2020 is an enormous challenge. To undertake such rapid industrialization, Malaysia will have to leapfrog intermediate stages of technological development. The Action Plan for Industrial Technological Development outlines the means to achieve this, setting the country on a fast track to the future.

Paul Icamina in Malaysia



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HEALTH: THE SOAP OPERA VERSION

Every evening in the bustling capital city of Cairo, people escape the sights and sounds of traffic jams, close their shops, and find time to participate in a popular Egyptian pastime: watching soap operas on television. And Cairo is not the only area in Egypt where this happens.

An estimated 52 million Egyptians, about 90% of the total population, sit with their eyes glued to the screen, waiting for their daily dose of Arabic television entertainment. The widespread use of television has made the medium the single most important tool of information dissemination in Egypt.

An IDRC-sponsored project is seeking to capitalize on this crucial fact and promote various health messages through a continuously running soap opera called *The Family House*. Beginning in the spring of 1992, this soap opera has reached out to millions of Egyptians with health messages on issues such as AIDS, drugs, child spacing, home accidents, and hygiene.

The trick, says the show's executive producer and communications expert, Dr Farag El Kamel, lies in making the show both informative and entertain-

ing. "There are two basic ways of delivering this information," he says. "One is to have crude and obvious messages in the form of public service announcements and the other, which we are striving for, is to infuse health information right into the dramatic narrative, so the learning process is subtle and can affect behaviour."

Dr El Kamel is Director of the Centre for Development Communication (CDC) in Egypt. In addition to a degree in journalism from Cairo University and a doctorate in communications from the University of Chicago, he has worked on several related projects using soap opera-like programs as channels for health information. "Soap operas in Egypt are different from those in other parts of the world," he says. "People here actually expect to learn something from the show."

In the past decade, there has been a growing trend in the use of mass media for health education in Egypt. The most notable case has been the use of short soap opera-like episodes in the prevention of bodily dehydration, caused by diarrhea — a sickness that used to cause about half of all infant deaths in Egypt. The programs, created in 1983, were produced by the CDC, in conjunction with the Egyptian Ministry of Health, UNICEF, and the US Agency for International Development.

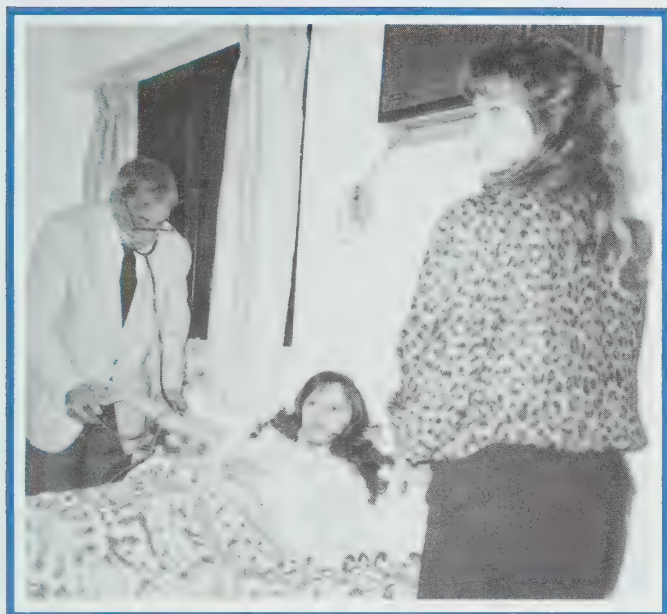
The campaign sought to inform mothers about Oral Rehydration Therapy and the use of salt packets to save childrens' lives. There were a series of 15 one-minute episodes; each scene depicted a baby suffering from diarrhea and the mother trying to help the child. The episodes used music and dramatic tension to get the message of Oral Rehydration Salts (ORS) across and to keep the viewers interested.

Well-documented research has shown that this public information program, aired in a dramatic style, had a tremendous effect on health awareness and increased usage of ORS. Surveys of knowledge, attitude, and practice were conducted using 1500 mothers annually between 1983 and 1986. In 1983, a mere 3% of the mothers knew about ORS and only half had ever used it. By 1986, however, 98% of those surveyed had been educated about ORS and 70% had already used it. These figures resulted in a drop in infant diarrheal mortality from 11.5 per thousand in 1984 to 7.1 per thousand in 1985.

The Family House soap opera is poised to pick up on this successful campaign and inform the Egyptian people on a broader range of health issues. It is the same concept as the Oral Rehydration Therapy campaign but there are many features that make *The Family House* unique.



Actors and crew prepare for a scene in the Egyptian soap opera, The Family House. The TV show is a good example of the use of television to disseminate health messages about AIDS, drugs, child spacing, home accidents and hygiene.



In this scene, the doctor checks the patient's blood pressure. "Soap operas in Egypt are different from those in other parts of the world," says producer Dr El Kamel. "People here actually expect to learn something from the show."

Dr El Kamel says that one of these things is the attention given to audience research and pre-testing. "We have a very extensive system of measuring audience knowledge, attitudes, and practices both before and after airing of the show," he points out. Data collected from sample groups of 200 people in Egypt, Morocco, and Jordan revealed common areas of concern in these countries. Issues such as child spacing and household hygiene came up often and gave researchers an opportunity to focus on specific subject areas.

In addition, before the show is aired, there will be a set of studies to determine peoples' beliefs and attitudes relating to a particular issue, such as sexually transmitted disease. The same sample will be tested after a specific program is broadcast to measure any changes in attitudes.

Researchers are discovering more about issues of public concern but they are also seeking information on how to improve the soap opera format. Based on suggestions and comment from this research, *The Family House* is designed to be a daily series that has multi-faceted characters, an exciting script, and the portrayal of real people with real problems. To accomplish these goals, Dr El Kamel realized he had to have high production standards. He recruited veteran writer/film director Hussein Helmy El Mohandis to write and direct the soap opera. He also managed to attract the well-known Egyptian actress, Nadia Lohtfie, to star in the lead role in the continuing series.

Another unique feature of *The Family House* is that it is the first daily series developed to be an unending story. As the main character, Amina (Nadia Lohtfie) is an artisan in her late forties who has raised four children by herself. The

storyline will revolve around her experiences and her children's adventures and relations. "It is through these real-life characters that we want to create natural and revealing portraits of issues and situations that are on peoples' minds," Dr El Kamel says. Set in both urban and rural locations, the shows themselves will be 45 minutes each and will try to depict accurately Egyptian culture in everyday language, clothing, lifestyles, and moral standards.

Although the show is striving to be authentically Egyptian, its producers are interested in distributing *The Family House* to other Arabic countries throughout Africa and the Middle East. "Egypt is the Hollywood of the Middle East," Dr El Kamel says. "Our series are aired regularly on the television stations of almost all the countries of the region." He thinks that the superior production quality behind *The Family House* will enhance the already popular reception of Egyptian programs in countries like Jordan and Morocco.

Dr El Kamel's lofty ambitions for this show are backed up by an impressive research record at the Center for Development Communication (CDC). CDC created and produced a dramatic series consisting of 130 short episodes which has aired on Egyptian television for the past seven years, achieving a substantial impact on the lives of millions of people in Egypt. CDC's success has attracted support from several development organizations, including IDRC, the Ford Foundation, and Johns Hopkins University.

Dr El Kamel is eager to take a good idea and improve upon it. *The Family House*, he says, will utilize Egypt's most accessible medium and deliver health messages to millions of Arabic people each day. The results, he adds confidently, should speak for themselves in the coming years.

Craig Harris in Egypt



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A PROGRAM FOR SUCCESS

China's proposed Three Gorges dam on the Yangtze River is going to displace about one million people, cost US\$10 billion, and cover one of China's most visited scenic attractions under 39.3 billion cubic metres of water. The result will be the world's biggest hydro-electric project, generating more than 80 billion kilowatt hours a year.

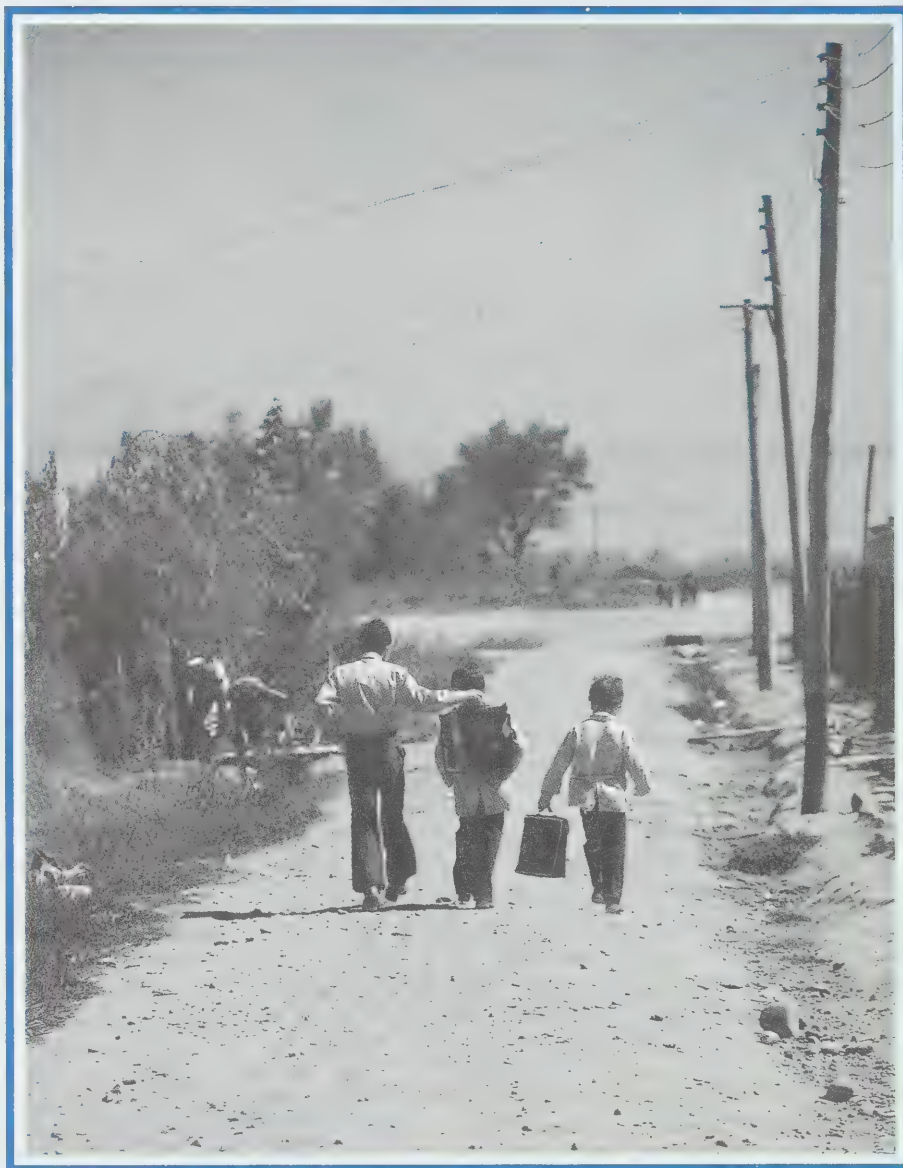
Building mega-projects like the Three Gorges dam, Brazil's Tucuruí dam, or India's Narmada dams is difficult and controversial. Many important issues have to be considered if such projects are to avoid being called monolithic symbols of environmental degradation or examples of planning disasters.

Some of these issues relate to population. In many instances, resettlement costs are not weighed when a dam is being planned. Factors such as moving large numbers of people, reestablishing communities and economic activities, and providing new facilities (schools, hospitals, etc.) cannot be overlooked. When these issues go unaddressed, the completed dams do not meet expectations.

To make such development initiatives successful, planners, municipal and provincial authorities, statisticians, researchers, and economists need better access to the wealth of population information generated by censuses and surveys. Until recently, this need was not being met adequately in the South.

REDATAM-Plus is a new software package designed to eliminate, in the planning stages, many of the problems that are generally perceived only after a project is finished. (REDATAM stands for REtrieval of DATa for small Areas by Microcomputer. Plus indicates this is the latest and most powerful version of REDATAM).

The software was created by the United Nations Latin American Demographic Centre (CELADE) in Chile and funded by IDRC and the



Among its many uses, REDATAM-Plus software allows researchers to more easily analyze large amounts of census data to facilitate planning for urban and rural communities.

United Nations. Its goal is to provide national statistical offices and independent researchers with a simple means to store and access large amounts of census (population and housing) and other data on a personal computer.

USER FRIENDLY

By compressing the data down to about 25% of its original size, the pro-

gram makes it possible for the computer to store microdata on millions of individual households and persons from one or more entire censuses and surveys. From this mass of data, the interactive and user-friendly program produces statistics rapidly and efficiently for development planning. The software normally tabulates variables for any small geographical area in



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seconds or minutes, depending on the number of cases to be processed and the computer's speed.

REDATAM-Plus allows the user to operate a multidisciplinary database, interface with Geographic Information System (GIS) software, operate the software in a Local Area Network, and produce camera-ready tabulations for publications.

CELADE's final technical report on REDATAM-Plus states the software is being used to detect pockets of poverty in Chile. The faculty of Environmental Studies at the University of Waterloo in Canada collaborated with CELADE on this project. The two institutions are again working together to combine REDATAM-Plus with GIS and visual aids to create tools that will facilitate decentralized decision-making in Chile.

The use of REDATAM-Plus has spread throughout Latin America and the Caribbean. The software is now a tool for researchers and development planners in national statistical offices (NSOs), planning ministries, and other public and private agencies in more than 30 countries in the region. It will help planners assess the spatial distribution of health services in Ecuador, analyze the constraints placed on agricultural land by the encroachment of urban areas in Costa Rica, and determine the effect of tourism on land use, the environment, and population distribution in the Caribbean. It is also being used extensively for censuses in Chile, Costa Rica, Ecuador, Honduras, Panama, Paraguay, Uruguay, and Venezuela.

Serge Poulard, CELADE's Caribbean regional census advisor, says, "On a 3½-inch disk, I can put a single Caribbean country's census data. It is unique because it allows you to pick and choose selected data in fields that you define from a large quantity of information. This is incredible." Once the data is on the disk, any researcher can work with it and it is easy to transport.

SPECIALIZED DATA

Prior to REDATAM-Plus, researchers and development planners had to rely on the work of NSOs for processed data. NSOs usually use mainframe

computers that store microdata on lengthy reels of magnetic tape. NSO demographers create as many tables and graphs with the microdata as they can, but they only describe trends at the national and regional levels and do not provide enough information about cities, towns, villages, or city blocks. REDATAM-Plus provides access to this data.

IDRC's computer and information systems specialist Peter Browne says the problem is often that each researcher and development planner needs specific microdata pertaining to small areas, not general, country-wide data. Before REDATAM-Plus, census microdata was essentially lost because few, if any researchers, had access to mainframe computers. In addition, NSOs were often unwilling or unable to produce specialized outputs. REDATAM-Plus lets users obtain tabulations to their own specifications rapidly, cheaply, and without the assistance of a programmer.

The REDATAM-Plus software, documentation and a demonstration database are available in English or Spanish for US\$75 to public and non-profit institutions in Latin America and the Caribbean (and for US\$90 to similar institutions in other developing regions). A demonstration disk in English and Spanish will be sent free on request to any public or private institution.

The system can be used on any IBM compatible PC with 640K RAM, DOS 3.0 or higher operating system and a hard disk with around five megabytes for the program. REDATAM-Plus normally compresses around a million cases of population census into 20 megabytes.

"REDATAM is more than a program. It is a way to store information efficiently over a long period of time. Bringing it to the personal computer platform is not only democratization of access to information, but also a better guarantee that the access will be transferred over the years," says Poulard.

Peter Newton in Ottawa



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FOCUS

Over centuries, indigenous people and farmers have developed their own region-specific knowledge and practices of agriculture, natural resource management, human and animal health, education, and many other subjects. This complex of knowledge, beliefs and practices is generally known as indigenous knowledge (IK) or traditional knowledge.

In recent years, interest about IK has grown, alongside recognition of its value for both aboriginal peoples and the industrialized world. Preserving IK is vital to the survival of the communities of aboriginal peoples and local farmers who acquired and protected this knowledge over generations. Support for indigenous and traditional knowledge could also serve as one measure of success in addressing issues of sustainable development. Indigenous peoples are the original practitioners of sustainable development, applying time-tested practices to establish an ecological balance with their environments.

Exchanges between indigenous peoples and Western knowledge systems can be mutually beneficial. Virtually every scientific and social discipline can find valuable insights in the centuries-old knowledge base of indigenous peoples. Similarly, indigenous peoples are more than ready to discover what is useful in the West and apply it to their own needs. The two-way flow of knowledge can only strengthen our mutual capacities to inch closer to sustainable and equitable development.

Editor-in-Chief

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KNOWLEDGE, CHANGE AND THE PRESERVATION OF PROGRESS

As geographic borders become more permeable, and knowledge more easily transformed into a marketable commodity, there is a growing realization that the traditional wisdom imprinting our cultural identities is being lost.

At the doorstep of the 21st century, both North and South face a tremendous diversity of global challenges. More than ever before, change invites reconsideration of the value of cultural practices, conventional social attitudes, traditional beliefs, and ancient forms of collective behaviours that many people thought had been transcended by progress and modernization.

Despite the captivating rhetoric of the development discourse in the early 1990s, the blueprint for remodelling the world order continues to be drawn by a Western concept of correctness, science and progress. Although the current trend is toward cultural homogenization, the spread of science, and the centrality of capital as the currency of development, there is also an emerging attempt to recover what modernization has systematically ignored over the years: traditional cultural knowledge.

Throughout the centuries, societies evolved by learning from experience. The collective ability to accumulate and transmit knowledge from generation to generation, and to apply it to produce new knowledge, have underpinned development. However, the speed of change today, the insatiable demand for solutions to the problems of a modern world, and the predominance of technology centred around market power rather than the empowerment of people, present new threats.

Developed and developing countries are finding it increasingly difficult to preserve the shared products of human learning. Science and wealth create for a relative few the ability to amass and transmit facts, rearrange social structures, and alter the natural order in dimensions never imagined before. For both developed and devel-

oping societies the meaning of collective symbols, customary practices, cultural identities, and, ultimately, the history of peoples, fades at a worrisome speed.

Unquestionably, international development priorities have suffered dramatic shifts in the last few decades. From a bipolar geopolitical order in the post-war period, attention moved toward expanding a dominant economic order and its perceived benefits to all corners of the globe. All along, the premise underlying the development discourse has been to extend the "gains" of progress beyond the industrialized world. However, reality shows that poverty, malnutrition, preventable child mortality, and various forms of discrimination persist in most of the world.

CULTURAL SPECIFICITY

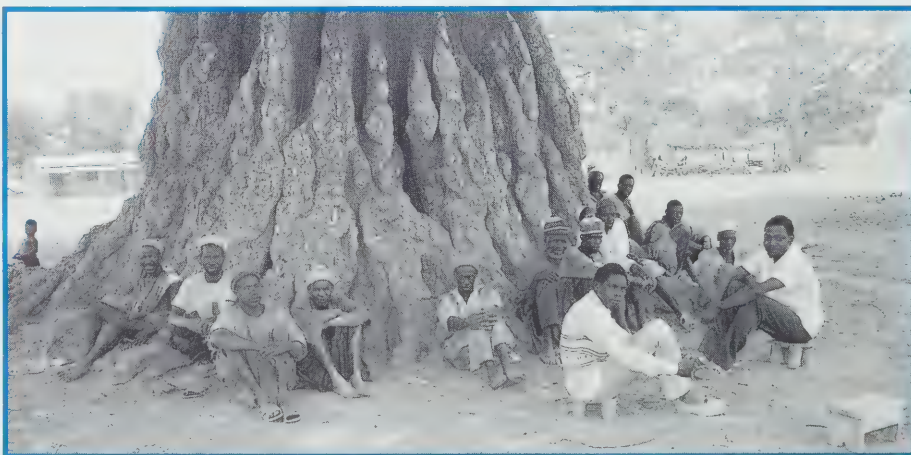
Present-day concerns focus on yet another politically correct development agenda driven mainly by the North, that of environmental sustainability. Today's changes are global in scope, and national and corporate in their motivation. But people in the North often misunderstand the cultural specificity of the South. They continue to neglect the human and socio-cultural base of knowledge at the root of sustainable development.

Nonetheless, a trend is growing to reclaim traditional cultural knowledge as a driving force of development. Northern countries in particular are

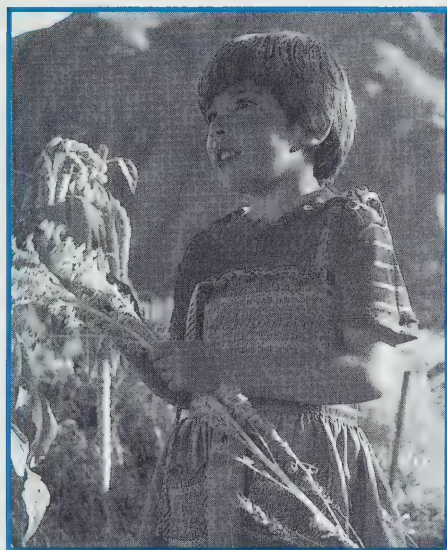
recognizing what people in the South have understood for years: that to enter the next century, modern societies must comprehend traditional cultural knowledge. Questions then arise about how to better understand traditional knowledge, how to preserve it in a meaningful way, and how to apply it to sustain development. The responses are not easily found and are often controversial.

Traditional cultural knowledge is a complex concept that reflects an even more complex set of empirical, intellectual, social and spiritual factors that constitute human culture. It refers to the integrated expression of collective values and customs that guide interaction among peoples, and between people and nature. By definition, traditional cultural knowledge is *systemic* and addresses aspects as diverse as how communities use and help reproduce their natural environment, how they manage their social organizations, and how they educate their children. Because of the diverse realities it reflects, there is no consensus about what traditional knowledge is, or how it is most genuinely expressed.

Efforts to understand traditional knowledge tend too often to frame the concept within politically correct dimensions currently in vogue. In a world system engineered to respond to measurable parameters of consumption, efficiency, and constant change, culture and human learning too often



There is an emerging attempt to recover what modernization has systematically ignored for years: traditional cultural knowledge.



Throughout the centuries, societies evolved by learning from experience and transmitting knowledge to younger generations.

become convenient instruments by which to manage crises created by neglect of the human side of development.

CONTRADICTIONS

The notion of traditional cultural knowledge is not free from contradictions. It helps some to legitimize static visions of the world, while others see idealized hope. In essence, however, traditional knowledge is a combined expression of culturally diverse individual and collective capacities to manage the social, political, economic and natural environment. To restrict its meaning to any single set of issues, or to see it as the domain of a single cultural group, separate from the collective, oversimplifies its development potential and makes it purely instrumental to short-term concerns.

Pressures to find quick solutions to the problems confronting industrialized culture lead to romanticized visions of traditional cultural knowledge. Too often it is perceived as an ancient pre-science that holds universal solutions to modern world problems. Unfortunately, these perceptions

fail to grasp the integral, holistic and cultural roots of traditional knowledge.

When perceived strictly in a time-line dimension, traditional knowledge becomes a collection of facts and practices frozen in the past. Its relevance for the modern world becomes tangential, reduced to ahistorical and acultural attempts to bring clusters of information forward to resolve diverse problems of the present. Traditional knowledge under such circumstances ceases to be *systemic* and *historical*, and becomes an accessory separated from its cultural milieu.

Those who look upon traditional knowledge purely from an ethnic perspective label it "indigenous." It is an expression of "curious" traditions and practices of native peoples whom modern societies still fail to see as part of their own social fabric. This perception dehumanizes traditional cultural knowledge and detaches it from the rites, languages and community practices that give it a historical dimension.

If traditional cultural knowledge is reduced to a utilitarian economic notion, its scope and potential impact are limited to the lessons drawn from the survival technologies and practices of materially impoverished peoples. But when it comes to applying such knowledge in modern science and business, little is done to recognize or compensate its originators.

DEEPER UNDERSTANDING NEEDED

Western societies' understanding of traditional cultural knowledge still has far to go to master the deeply rooted values beneath the cultures of peoples at the centre of development agendas. Industrialized societies concerned with preserving their own progress must drastically change their cultural perception of development. From a position of cultural dominance, current Western notions of progress, modernity, and human development must give way to a broader recognition of the ethos that gives meaning to traditional knowledge in cultures different from our own.

A full agenda of issues needs to be better understood before we may place traditional cultural knowledge at the centre of our search for direction in development and change. Rather

than addressing traditional knowledge as a curiosity that complements our visions of where societies should go, it should be approached as a source of learning to understand from where our societies come.

This perspective implies going beyond functional aspects of traditional knowledge to comprehend the complex interaction among artistic and spiritual practices, language and communication, patterns of social reproduction, practices in community governance, and management of natural and human resources. In sum, it implies a different way of looking at what development is about.

Daniel A. Morales-Gómez is Director of IDRC's Social Policy Program.



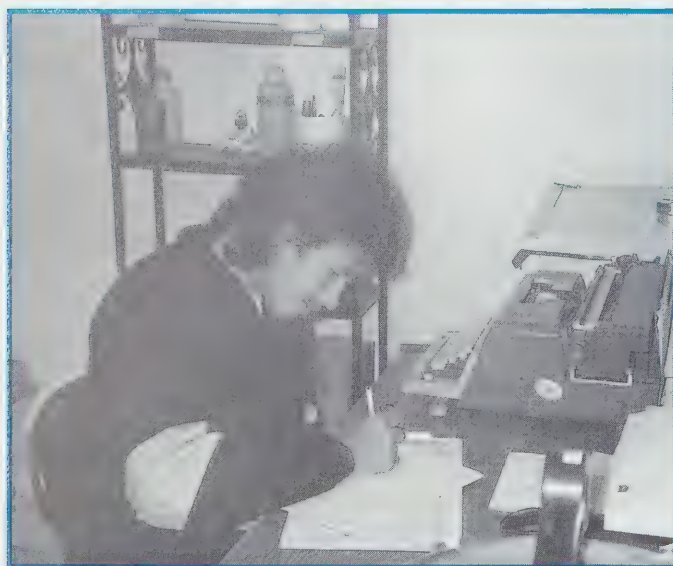
INDIGENOUS PEOPLES TEST THE WATERS

After years of suffering the effects of contaminated water, the Cree Nation of Split Lake, Manitoba has proven that remote communities can restore water quality without relying on expensive and distant laboratories.

The success of the IDRC-sponsored project in Split Lake holds great promise for any community in the developing world where simple, inexpensive and reliable tests for water quality are needed. Perhaps more importantly, the project proves that new technologies can be mastered by communities possessing only modest technical training. The Split Lake experience reflects increasing interest in indigenous communities across Canada in joining Western science with traditional knowledge to solve environmental health problems such as water quality.

For almost 10 years, IDRC has been supporting a research network in developing countries to create simplified water quality testing technologies (See box, page 8). These technologies were proven to work when tested by trained field and laboratory technicians. But could local people in these countries do it themselves? For Dr Gilles Forget, Director of Health, Society and the Environment at IDRC, the basic question was: "Can we transfer this know-how to the community?"

Split Lake was more than ready to be a pilot test site. According to Band Chief Norman Flett, there had long been concerns about the quality of the community's water supply and its health impact. Elders and children were suffering regular bouts of diarrhea, a problem particularly serious in infants. Children also had skin rashes from swimming in polluted recreational waters.



The Split Lake Band set up a water-quality testing lab in the basement of the nursing station.

The community sits on the shores of Split Lake in northern Manitoba and counts some 1,600 inhabitants. It is surrounded upstream and downstream by developments in the Churchill-Nelson hydro-electric project. These developments brought drastic changes in lifestyle and a decline in water quality, says Chief Flett.

Split Lake has a water treatment plant and two types of distribution. Roughly half the households are served by pipe directly from the plant. A truck delivers water to the remainder of homes, where it is stored in large water barrels. Unhygienic practices can bring contaminants into drinking water at any point between the treatment plant and the end use. For example, the hose from the water truck might be dragged through a yard, or dirt or unwashed utensils might get into a water barrel. Fluctuations in water levels caused by the hydro-electric projects may worsen the contamination of both drinking and recreational waters.

UNTIMELY DELAYS

Convincing the provincial and federal governments to address water-quality problems was not easy, says Chief Flett. The water-quality monitoring program run by Health and Welfare Canada proved too time-consuming and untimely. It required a community health representative to collect samples at predetermined sites and send them by land or air to provincial laboratory facilities hundreds of kilometres to the south. Delays of four to six weeks meant the test results were of no use in pinpointing problems so they could be fixed.

The water-quality problems in Split Lake were familiar to Peter Seidl, an Environment Canada biologist. He had studied the impact of northern Manitoba's hydro-electric projects on water quality in native communities. Mr Seidl's work led him to consult Dr Bernard Dutka of Environment Canada's National Water Research Institute (NWRI). Dr Dutka was also involved in the IDRC research network on water testing technologies. In this way, the interests of IDRC and the Split Lake Band found common cause.

IDRC wanted to determine whether a community such as Split Lake could acquire sufficient expertise to carry out relatively simple but effective tests of microbiological water quality. "We have always been focused on the people themselves," says Dr Forget. "We thought that we should go down the educational level to see how far we could go before people couldn't do these tests themselves."

The first phase of the Split Lake study, begun in 1990, evaluated the field performance of two water-quality tests, the Presence/Absence (P/A) and the A-1 Broth tests. Victor Spence, a member of the Band Council and Chair of the Health Committee, took on the job of project leader. He was supported by Mr Seidl (who continues his involvement from a new post at the International Joint Commission for the Great Lakes) and by Dr Dutka, who carried out laboratory validation and evaluation of the modified test procedures. A small laboratory was set up in the nursing station and band member Douglas Kitchekeesik was trained to perform the tests. Mr Kitchekeesik's wife Alana later became the second community technician.

Filling water barrels in peoples' homes must be done without introducing contaminants into the supply.



"The testing that we established in our community resulted in more awareness of the quality of the water," says Chief Norman Flett. "People were able to find out within a couple of days or so if their water source was contaminated and the problem was rectified."

Following the success of phase one, a second phase began in 1991 to evaluate two other tests in northern conditions, the hydrogen sulphide (H_2S) and coliphage tests, and compare their effectiveness with the two initial testing procedures. An additional project component assessed the knowledge and practices of the community with respect to water quality and use, with a view to strengthening community health interventions. During this phase, Doug and Alana Kitchekeesik completed a four-week program at a provincial government laboratory in southern Ontario to broaden their knowledge and skills.

SIGNIFICANT REWARDS

For both IDRC and the Split Lake community the collaboration has brought significant rewards. IDRC now knows it can transfer this type of technology directly to a community. "We were quite pleased to see that people themselves — not scientists, not highly trained technicians — can actually do this testing and are empowered to secure clean water that is not going to provide them with anything but healthy lifestyles," says Dr Forget.

Up in Split Lake, the resolve to make local water testing a permanent service was demonstrated by the community's recent hiring of the Kitchekeesiks as its official technicians. The new awareness of how water can be kept clean is changing attitudes, and may eventually have more far-reaching impact. "We proved that it can work in a small

isolated community. We feel that other native communities across Canada and across South America can benefit from these labs that we established," says Chief Flett.

Indeed, there is great scope for many more native communities to address water quality and other environmental health issues, according to native biologist Henry Lickers. He lives in the Mohawk community of Akwesasne on the St. Lawrence River and chairs the Chief's Committee on the Environment for Canada's Assembly of First Nations.

Like many native communities around the Great Lakes and the St. Lawrence River, Akwesasne has witnessed a degradation of both water quality and traditional economies based on fishing, trapping and agriculture. "PCBs, mercury, myrex, dioxins, dibenzylfurans — a whole host of alphabet soup of contaminants have been introduced into our water systems to such an extent that even the fishes that once sustained our people, to about 75% of our protein source, can no longer be consumed," says Mr Lickers.

NATIVE HEALTH NETWORK

But a positive development, Mr Lickers notes, is the expanding network of native communities throughout the province of Ontario investigating water quality and environmental health problems. "These are native scientists, native leaders, chiefs using our own traditional knowledge of the way to work within our communities in order to look for solutions to some of these problems," says Mr Lickers.

Mr Lickers says his scientific training taught him how to describe the world down to the level of the microgram. But it was his grandfather who gave him the *spirit* of the land. "He talked about the things that affect my soul." Mr Lickers says that uniting traditional environmental knowledge with



The Split Lake experience has proven that remote communities can do their own water-quality testing.

western science creates "an incredibly powerful tool." He is witnessing an increasing number of partnerships between native groups and the Canadian government to tackle problems of health and the environment. "Native people are willing and able to take control of these types of things. We have the tools, what we need are the resources to help us carry out this function."

Neale MacMillan in Ottawa



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NUTS AND BOLTS OF WATER-QUALITY TESTING

Water quality tests look at the microbiology of water samples to identify viral, bacterial and parasitical agents linked to hepatitis A, diarrhea, typhoid and other illnesses.

The research supported by IDRC since 1984 in nine countries in Asia, Africa and Latin America to develop simplified water-quality tests has led back to three older but perfectly sound technologies. Along with the more recent coliphage test, they have been adapted to serve the basic needs of isolated communities simply, reliably and cheaply.

Two tests are best suited for monitoring drinking water quality. The Presence/Absence (P/A) test mixes the water sample with a special broth medium, incubates the mixture overnight at ambient temperatures (between 20°C and 30°C), and depends upon a colour change to indicate the presence of contamination.

The hydrogen sulphide (H₂S) test uses a treated paper strip that is incubated with the water sample. If bacteria are present in the sample, they produce hydrogen sulphide, which turns the paper black. The test can also indicate the severity of water contamination.

Two other tests are intended for monitoring water sources and recreational waters. The coliphage detection test indicates the presence of "coliphages," viruses that accompany fecal coliforms like *Escherichia coli* and prey on them. Fecal coliforms in water are a sign that other dangerous bacteria, viruses or parasites transmitted by people may be present. The water samples incubate overnight between 27°C and 31°C in petri dishes containing small disks of filter paper that hold the dried *E. coli* host bacteria. Clear spots in the dishes mean the bacteria have been prevented from growing because of coliphages, thus indicating contamination of the water with fecal coliforms.

The A-1 Broth test requires water samples to be incubated in a tube of culture medium at 44.5°C for 24 hours. If there are any fecal coliforms in the sample they will survive this heat and produce gas that will be visible in a second tube inverted inside the first tube.



THE KNOWLEDGE PATH FROM CREE TO MAPUCHE

“Our brothers of Canada have spoken of things that for us the Mapuche are in common. They have spoken of the creator, the family, our ancestors, women, men, children, of the mother, the earth, fire, the living beings — of water as an element that accompanies man whether it be clean or, as it is today, contaminated.”

— José Rain, Chief of the Chol-Chol Mapuche in Chile, speaking at the IDRC symposium “First Nations Adopt Southern Technologies for Health,” in Ottawa, November 1992.

The Canadian brothers of Chief Rain are the Cree People of the Split Lake Band in northern Manitoba. The two indigenous peoples, supported by IDRC, are embarking on a unique form of technology transfer. The Mapuche will be trained to use simple tests for monitoring the safety of drinking water systems. But the trainers are the Split Lake Cree rather than non-native technicians. The project could help transform today’s unsafe water into tomorrow’s clean lifesource. Moreover, it could spell a promising new channel for technology transfer between aboriginal peoples.

The Split Lake community and IDRC have already collaborated successfully in a three-year project that showed how native people can train themselves in simple water-quality testing to ensure the safety of their water. The technical knowledge passed from specialists in microbiological water-quality testing to Band members in the community. The technology for these tests was developed by a network of scientists in developing countries, supported by IDRC.

Now, the question is whether the technology transfer can occur between two sets of indigenous peoples, says the IDRC’s Dr Gilles Forget. “How far can it be translated before something is lost in the translation?” asks Dr Forget.

REACHING OTHER COMMUNITIES

Dr Forget says he was pleased when the Split Lake Cree and their project consultants thought of reaching out to other aboriginal communities. They suggested that many native communities in the Americas were as isolated as themselves, says Dr Forget. “Their problems may be different, but they still don’t have this water-quality testing. They don’t know whether the water they are drinking is safe.”

The technology transfer in Chile will involve two Mapuche communities whose living conditions differ markedly. The Maquehue Mapuche live near the city of Temuco (some 650 kilometres south of Santiago) in Chile’s ninth region. Their water is drawn by hand pump from wells, stored in elevated tanks and can be distributed to households. The community also has limited access to electricity. The Chol-Chol Mapuche, on the other hand, are many hours from Temuco and quite isolated. Their water comes directly from rivers and springs. According to Dr Forget, people there are sure their water is bringing them sickness. “They notice it changes to a murky colour at certain times of the year.”

A Chilean non-governmental organization that works with the Mapuche people, Trafkin, will administer the project funds. It will set up a laboratory in Temuco to prepare media from which to grow bacterial cultures found in the water samples. Later, a laboratory may be set up in Maquehue.

COUNTERPART TRAINING

In the fall of 1993, Chief Norman Flett and his community’s water-quality technicians, Alana and Douglas Kitchkeesik, will travel from Split Lake to Chile. The Kitchkeesiks are studying Spanish in preparation, but will also use the services of interpreters. The Cree technicians will spend about a month teaching the Mapuche technicians-in-training the necessary steps in running a water-testing program.

The project has technical backup from the water company in the region, and from Dr Gabriela Castillo of the University of Santiago. (She is a researcher in IDRC’s developing-country network on water-quality testing.) Dr Castillo in turn can call upon the expertise of Dr Bernard Dutka of Canada’s National Water Resources Institute. Dr Dutka, along with Mr Peter Seidl of the International Joint



Cree technicians from northern Canada will travel to Chile’s ninth region to train the Mapuche people in water-quality testing.



RECOGNIZING TRADITIONAL ENVIRONMENTAL KNOWLEDGE

Commission for the Great Lakes, is overseeing a secondary component of the project. It will investigate the presence of toxins in water sources in the Mapuche communities.

Apart from the technical aspects of the project, the Cree and Mapuche Peoples plan to become better versed in each other's culture. They will also have a chance to compare notes on native self-government: this is an area where Canada's Cree People already have some experience, but it is a relatively new direction for the Mapuche in Chile, according to Dr Forget. The project will end with a week-long workshop reviewing the experience.

If the Cree-Mapuche technology transfer meets expectations, Dr Forget says that IDRC foresees establishing links with other indigenous nations to promote useful technologies. For his part, Mapuche Chief José Rain already assumes that water-quality testing will be successfully introduced to his community. "My hope is to teach it to other indigenous people," he says.

Neale MacMillan in Ottawa

Western science's failure to recognize traditional environmental knowledge (TEK) was first made obvious to Martha Johnson more than ten years ago when she was working as a high school teacher in Povungnituk, an Inuit community in northern Quebec.

She remembered realizing that "as a non-Aboriginal trying to teach science from a Western perspective, it wasn't working. So I asked myself, 'How do the Inuit perceive the environment?'"

Johnson began experimenting in learning techniques to find ways of tapping the knowledge passed down among the Inuit. In one exercise, she gave students a diagram of the Arctic food chain and asked them to make the links. One practically illiterate boy made the connections without any problems.

Later, Johnson pursued a Master's degree in Environmental Studies and Anthropology at the University of Toronto. Her major paper examined Inuit folk ornithology, comparing Inuit classification of birds to Western groupings.

Johnson's grassroots experience with Aboriginal communities and her formal studies helped her recognize the holistic nature of TEK. "It combines biology, linguistics, social sciences, and other disciplines and connects them in an interdisciplinary way to examine how people perceive their world, live within it and use its resources" she comments.

Johnson spoke about traditional environmental knowledge, the reasons behind its growing recognition, and current research in this field during an interview in Ottawa early this year. She is now Research Director of the Dene Cultural Institute in Canada's Northwest Territories. The Institute works with Dene communities to preserve and promote this Canadian aboriginal group's culture, through research and education.

Much of the Institute's work has focused on TEK through research and the publication of a book entitled *Lore: Capturing Traditional Environmental Knowledge*, edited by Johnson. The book was based on papers produced from a 1990 workshop on TEK, organized by the Dene Cultural Institute. IDRC funded the workshop as a cultural exchange between researchers in developing countries and those working in Canadian aboriginal communities. Community-based projects on TEK in the Amazon Rainforest, the African Sahel, the South Pacific and Southeast Asia were represented at the workshop. The Institute also invited aboriginal community members and researchers from northern Canada's Belcher Islands.

Workshop participants discussed the problems of gathering TEK and integrating it with Western Science to improve natural resource management. They also experienced Dene culture through food, music and dance. The participants' papers, outlining their project's research methodology, were incorporated in *Lore*.



Martha Johnson sees a shift in attitude in the scientific community toward traditional environmental knowledge.



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ASSIMILATION OF KNOWLEDGE

According to Johnson, Western scientists have until recently ignored TEK because they assume much of its validity has been lost owing to Western assimilation of indigenous peoples and their knowledge systems. A separate factor is that, unlike Western science, TEK is not easily quantifiable.

In the past, Western scientists have interpreted the traditional emphasis on spiritual explanations as superstition. They also dismissed any emotional or subjective aspects of traditional knowledge in favour of the Western preoccupation with objectivity and the separation of self from the object of study. Johnson says TEK challenges Western science's foundation in the Judeo-Christian belief in humanity's dominance over nature.

Johnson attributes the changing attitude of Western scientists towards TEK to heightened political consciousness among indigenous peoples and their struggles for self-determination, more documentation of TEK, and a growing international environmental movement searching for new alternatives to natural resource management.

"Western society is searching for the spiritual element of life that it has been lacking for so long," she commented,

referring to "Deep Ecology" as one movement that examines the spiritual interconnection between humanity and nature.

Johnson and other advocates of TEK are anxious that the shift in Western attitudes not lead to the cultural appropriation of indigenous knowledge systems in ways that do not benefit indigenous peoples. "It disturbs me when people are not given credit for what they've created or aren't able to enjoy the benefits of their work."

For Johnson, traditional communities could be given credit for the concept of sustainable development, a concept they have long understood and which is now trumpeted throughout the West. "Indigenous peoples have lived within the means of their communities, its land and its resources. They have conserved natural resources while thinking of other communities and future generations."

Johnson says there is a willingness in aboriginal communities in northern Canada to preserve existing sustainable systems and to consider increasing the application of TEK. This belief is based on her involvement in a pilot research project undertaken by the Dene Cultural Institute in 1989 and completed in 1992.



Norwegian anthropologist Edvard Huiding (left) and Dene Project Ecologist Robert Ruttan participated in the workshop on traditional environmental knowledge.

The goal was to develop a research methodology to discover from community members what TEK is still in use by the Dene, along with evidence of how this knowledge continues to govern their land and resource use. This information was to be used for environmental management and education. Fort Good Hope, on the Deh Cho (Mackenzie) River in the Northwest Territories, and the neighbouring community of Colville Lake were the pilot project sites.

Data collection relied on interviews, translated into the Dene language of North Slavey, and participant observation. Researchers recorded community knowledge on animal ecology, local ecosystems, and traditional rules of land and resource management.

TRADITIONAL RESOURCE MANAGEMENT

The research indicated that a traditional Dene system of resource management still exists among the elders and to a lesser extent, among younger Dene. Although the younger generations use more modern technology, Johnson says the research showed that they still rely on their environmental knowledge to hunt and survive on the land. This reality points to the continued relevance of traditional environmental knowledge, Johnson says, noting that many Dene will have to live off the land because their communities lack wage labour. Most Dene want to remain in their communities, she says.

Johnson says a drawback of this type of research is its failure to involve younger Dene. Because they often lack fluency in the Dene languages, they are excluded from being project researchers. "There has to be a means of encouraging young people not only to learn about traditional environmental knowledge but to apply it to their everyday living. Traditional environmental knowledge will have no future unless major steps are taken to stop the movement of youth away from aboriginal culture."

A further drawback was poor communication within the two Dene communities, which produced low community support for the project. Johnson says part of the reason was that the Dene Cultural Institute rather than the community itself made key project decisions.

But the Institute is building on the experience of the pilot project. It has initiated other research projects on traditional medicine and justice in co-operation with the Arctic Institute of North America, based in Calgary, Alberta.

On top of safeguarding TEK within aboriginal communities, Johnson also calls for integrating it more broadly with Western science. Global ecological interdependence makes this marriage a necessity, Johnson says. TEK could provide insights into natural resource management in under-studied areas such as wetlands, high altitude zones, coastal regions, drylands, and circumpolar regions. It could also promote conservation education and offer holistic environmental assessments for development planning.

In Johnson's view, local indigenous researchers and professional researchers trained formally in Western methodology can collaborate to great effect. She points to the way aboriginal researchers made the pilot project more responsive to Dene culture by signalling the concept of "management" as unacceptable because it implies human control of nature. The Dene believe that, without human interference,

DEFINING TRADITIONAL ENVIRONMENTAL KNOWLEDGE

In the introduction to *Lore*, Johnson defines traditional environmental knowledge as "...a body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. The quantity and quality of traditional environmental knowledge varies among community members, depending upon gender, age, social status, intellectual capability, and profession. With its roots firmly in the past, traditional environmental knowledge is cumulative and dynamic, building upon the experience of earlier generations and adapting to new technological and socioeconomic changes of the present."

Traditional environmental knowledge is also referred to as knowledge of the land, ethnoecology, indigenous knowledge, folk ecology and customary law.



Martha Rabesca, an elder member of the Fort Good Hope TEK pilot project steering committee.



Workshop participant Brigitte Koné is a community researcher in Mali for the SOS Sahel Oral History Project.

nature takes care of itself. Dene opposition to putting radio collars on caribou is an example of this belief, says Johnson.

Aboriginal researchers also opposed asking community members for specific numbers of animals killed in hunts. They said that many Dene would not provide accurate numbers for fear of government reprisals or of being seen to brag about hunting accomplishments, an unacceptable practice in their culture.

For their part, the professional researchers, including Johnson, possessed complementary research skills and continually asked for explanations about things the indigenous researchers considered obvious. Aboriginal researchers suggested omitting certain questions from the interview guides because they assumed the answers were common knowledge. Yet for the outsider or younger Dene, these answers are often important for understanding TEK and its application. "Researchers must focus on the strengths of both traditional environmental knowledge and Western science," says Johnson.

WHO DECIDES?

Will traditional environmental knowledge lose much of its content and significance if it is integrated with Western science? "Key to the integration process is letting aboriginal people make choices about resource management and knowledge systems," Johnson answers. "This will ultimately give control back to these people and ensure that traditional environmental knowledge systems survive as systems which meet their needs. The real issue is who is making the decisions rather than what knowledge base they are adhering to."

Johnson says it is difficult to evaluate the success of integration with Western science because of the strikingly different ecological, economic and political contexts of the world's indigenous peoples. At one end of the spectrum is the widespread killing of Brazilian aboriginal people and simultaneous destruction of their indigenous knowledge. At the opposite end are the indigenous people of the South Pacific's Solomon Islands who both govern themselves and enjoy the authority to utilize traditional systems.

Yet overall, Johnson says she is optimistic about the future of TEK. Aboriginal self-government has the potential to ensure the survival of such knowledge among aboriginal communities in Canada if it is made a priority of self-determination. There are increasing partnerships between indigenous peoples, governments, and development and research organizations that strengthen indigenous knowledge, Johnson noted.

Most uplifting to Johnson is the growing recognition that TEK connects Canadian aboriginal communities and other indigenous people in the South. "Traditional environmental knowledge and its research have emphasized the commonality of problems, concerns and solutions that are to be found among the world's indigenous peoples."

For Martha Johnson and other advocates of TEK, the hope remains that this knowledge will help preserve the identity of indigenous communities and contribute to resolving their common problems of poverty, assimilation and cultural misunderstanding.

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THREADS OF COMMON KNOWLEDGE



CIDA : Cindy Andrews

Rice crop, Vietnam: preserving plant diversity requires documenting the practices of local farmers.

More and more, researchers on sustainable development are taking a serious look at indigenous knowledge (IK). They can hardly avoid doing so since IK is like a thread running through the human community, touching on biodiversity, climate and countless other activities. Take shamanism, for instance.

"The origins of Amerindian shamanism are Asiatic, possibly proceeding from millenia of shamanistic religions in Northern Asia and Southeast Asia," says Elizabeth Reichel, a professor of anthropology at the Universidad de los Andes, Colombia.

Prof Reichel defines shamanism as a political and religious technique for managing societies through certain

ritual performances, myths, and world views, such that a community respects the natural environment and community life as a social common good. Shamanism is still the basic worldview of 70,000 Amazonian Indians in Colombia and of more than 30 million Amerindians in Latin America, she adds.

Prof Reichel shared her observations with participants at a symposium on indigenous knowledge and sustainable development, held in late 1992 in Silang, Philippines. It was convened by the International Institute for Rural Reconstruction (or IIRR, based in Silang) and IDRC.

In the Miritiparana area near the Colombian-Brazilian border, says Prof Reichel, shamans practice environmental "accounting": an awareness that action upon the environment always begets reaction. "These indigenous societies can be said to be among the few ones left with a strong cultural

tradition of indigenous sustainable development. In Colombia, shamanism is a form of eco-politics, a mechanism for the regulation and control of resources."

Prof Reichel laments the diminishing role of shamans as the government opens Amazonian lands by recognizing land titles. The system creates new forms of land tenure and political representation on top of the old. Where before the shaman decided the best ways to hunt or harvest food and forest products, he is now unrepresented in the new system of elected officials.

"The native people in Asia, Africa, Canada or Latin America have far more in common in terms of their conceptualization of nature and its bearing on our life compared to the rest of the population," observes Kirit K. Patel of the Center for Management in Agriculture, Indian Institute of Management, in Ahmedabad. "The Inuit, Australian Aborigines, Mohawk and

other Indian tribes have always considered that a common thread runs through animals, earth and human beings."

On Malalison Island in the central Philippines, reefs are known by names handed down through generations, and islanders reckon distances in terms of fathoms and take their bearings from human landmarks such as a house on the mainland. The island was chosen by the Southeast Asian Fisheries Development Center (SEAFDEC) as a pilot site for sea-farming technologies, sea-ranching and the granting of territorial use rights in fisheries. The cornerstone of the project was local involvement, so the research turned to the ways of the fisherfolk.

While the people's fishing methods are specific to the island, "Malalison fishers are not unique," said SEAFDEC's Susana V. Siar. "The islanders are no different from the islanders of the Torres Strait or the raft fishermen and shore dwellers of Brazil, who possess a system of naming sea space and marking specific fishing spots through landmarks."

SUSTAINABLE DEVELOPMENT AND IK

"Many people realize one cannot talk of the value of natural resources in human terms without falling back to what people know about them and how they use them," says Christine Kabuye, the botanist in charge of the National Museums of Kenya's East African Herbarium. "And when it comes to sustainable development, incorporating indigenous knowledge is a must."

The Herbarium has collected data on plant uses since 1900, mostly on medicinal and chemically interesting plants. But it was not until three years ago that it started looking at wild food plants as substitutes for common crops that cannot be grown sustainably on marginal land. The results show that some indigenous food plants are far more nutritious than exotic ones.

"Because indigenous knowledge has been largely derived through oral traditions passed down over generations, much has been lost forever," says Raymond Obomsawin, a senior

consultant at the ONAKE International Applied Research Project in Ontario, Canada. "The question of its preservation, expansion and practical use is especially urgent."

IK can be lost in unpredictable ways. The Green Revolution, for instance, made its own contribution, says Gordan Prain of UPWARD (User's Perspective with Agricultural Research and Development), based in the Philippines. "The successful exploitation of wheat and rice germplasm diversity was causing the disappearance of that diversity as farmers switched to the new varieties." The response to vanishing diversity was to collect accessions for more than 50 crops in over 100 gene banks worldwide. But little in the collections has been characterized properly. Without systematic characterization, gene banks are like "pharmacies filled with miracle drugs without labels."

"Almost absent from this potted history of plant genetic resources are the past and present users and originators of genetic diversity: farming households the world over, but especially rural people living in the more diverse and difficult environments of tropical and sub-tropical regions where the great majority of crop diversity is to be found," says Mr Prain. "Modern crop varieties often bring with them novel practices and these combine to erode the communal memory." UPWARD has completed "memory banking" in two communities in southern Philippines where the practices of local farmers with traditional varieties of staple and supplementary crops were documented systematically.

TIME-TESTED RESOURCE MANAGEMENT

Conservationists emphasize the importance of IK with respect to biological diversity, which must be preserved before as yet undiscovered species are lost forever. For David Hyndman, a senior lecturer in anthropology at Australia's University of Queensland, converting rainforests and inshore coral reefs into wilderness preserves is "no more than robbing indigenous peoples of their homeland and assigning it an artificial idealized landscape in which humans have no place. Biological and cultural diversity

would best be achieved by keeping indigenous people on their homeland and allowing them to employ their own time-tested sustainable resource management."

Another theme addressed by the symposium was access to IK and intellectual property rights. How can local people be protected from exploitation of their knowledge and resources? What compensation can they get for their valuable information?

The annual value of medicinal plants derived from IK is estimated at some \$54 billion in 1989. But indigenous people see no financial compensation for the hundreds of years of experimentation and innovation that led to the use of these plants.

"At present there are no provisions for the protection of knowledge rights of indigenous peoples," says Prof Hyndman. "Dissatisfaction with this exploitation led to the fight for indigenous intellectual property rights of the kind granted to universities and individuals for innovative R & D in the form of patents and copyrights."

The keynote speaker at the symposium, the Honourable James Bourque, a Canadian indigenous person, urged participants to focus on the practical application of IK in development activities to the advantage of local people. He saw a danger that the retrieval of IK would benefit only the scientific community and the Western world.

"For whose benefit?" asks Shahid Akhtar, Director of the Information and Communication Systems and Networks Program at IDRC. "The indigenous populations must be the main beneficiaries of any information system or network that is established. Western researchers [can] also be users and participants but fundamental issues related to intellectual property rights and research ethics make it essential that original owners and keepers of the knowledge retain access and control."

There must also be opportunities for giving IK wider relevance, according to D. Michael Warren, director of the Center for Indigenous Knowledge for Agriculture and Rural Development, in the United States. Research should look "on the utility of indigenous knowledge and innovations from one

Access to IK should consider provisions for protecting the knowledge rights of indigenous groups and local communities.



IDRC

ecological zone to a similar zone in a different part of the world."

The symposium identified many such research gaps. These included agriculture, genetic resources, forestry, natural resource management, aquaculture, human health, veterinary medicine and livestock management, and communication and organizations. The role of primary and elementary education in promoting and displacing local knowledge among children also attracted attention.

"A study in a rural Mexican village revealed that non-Indian school age children identified and knew the uses of 37 plants compared to Otomi children able to do the same for some 138 plants," observes Raymond Obomsawin. "Yet, it is the Indian Otomi children who are deemed ignorant and in need of an education." Around the world, institutionalized childhood education, "has undermined viable indigenous traditions of familial based education," he says.

In other disciplines too the professional perspective takes on special importance. To many foresters doing research in Nepal, a formerly forested area that has been reduced to shrubland is considered "degraded." They often advise replanting with high canopy timber.

"From the perspective of the local farmer, with his need for fuel, fodder and grazing land for cattle, such shrubland often has survival meaning, in contradiction to its production meaning to foresters," says Dr Donald A. Messerschmidt, a social forestry adviser to the Institute of Forestry in Pokhara, Nepal. "The benefits of tall timber generally go to loggers and middlemen and seldom to poor farmers. Benefits of shrubland may be many — more species to harvest, more land available to graze, less erosion and gullyng."

Forestry, education and the many other issues related to IK will be further explored by IDRC in coming months, with a view to determining IK research and information priorities. It has begun consulting with IK scholars, indigenous groups and others to gauge the need for IK networks.

The symposium has advanced this work by developing recommendations for recording IK, preparing training manuals, communicating and using IK, and for research and policy relating to IK. It also formulated an action plan for an IK network. Discussion on methodology dealt with recording, storage, validation and selection of IK as well as training in all these aspects.

Indigenous knowledge, says IDRC's Shahid Akhtar, "provides the basis for grassroots or local-level decision-making, much of which takes place at the community level in rural areas where the majority still lives. Very little of this knowledge has been recorded, yet it represents an immensely valuable data base with insights on how numerous communities have interacted with their changing environment."

Paul Icamina in the Philippines



HI-TECH SOFTWARE USED TO CONTROL MALARIA

Malaria, one of the most common diseases affecting people in the tropics, has made a comeback. Epidemics are increasing, despite decades of control programs in various countries around the world.

Preventing or remedying malaria's spread is difficult. In hot, humid climates, people are exposed to the elements, often living in houses constructed of mud grass and bamboo. This gives little protection against the malaria-carrying female *Anopheles*, who is insatiable in her quest for the blood needed for her eggs to mature. It is also a huge challenge to control insect numbers, as those mosquitos can breed anywhere — even in water filling an animal's hoofprint.

Malaria cases are increasing rapidly in Brazil. From 1980–1991, reported confirmed cases more than tripled from 169,871 to 533,360, according to the Brazilian Ministry of Health. Malaria causes serious illness and death. Those people with malaria who do not die from the illness are nonetheless rendered quite sick, physically weak and unable to work due to the recurring fever and fatigue. The widespread death and illness caused by malaria is a serious roadblock to development.

In the Amazon, where 90% of the Brazilian incidence of malaria occurs, the spread of the disease has put a stop to the development of key mineral and agricultural potential. Surveillance, prevention and control measures are no longer effective. Areas once cleared of malaria are developing new outbreaks and developing stronger resistance to insecticides and the antimalarial drugs.

Despite more than 30 years of work by SUCAM — the division of the Ministry of Health that has been responsible for malaria surveillance and control — the disease is increasing too quickly for the agency to effectively contain its spread.

In an effort to address the problem, researchers at the Federal University of Rio de Janeiro's (UFRJ) biomedical engineering department have developed a computer software program called SIG-MALARIA, designed for malaria surveillance. It uses a microcomputer-based image information system to evaluate malaria in municipalities. It also produces information to be used for decision-making in the prevention and control of the disease.

In future, the software will be used at SUCAM's regional offices as a tool to improve malaria control at both the regional and central levels in Brazil. The Pan American Health Organization has expressed interest in using the software and in helping with future stages of its development.

The development of this software — funded by UFRJ and the International Development Research Centre (IDRC), with SUCAM providing necessary field and lab data — represents a big step forward for planners. It factors in important variables which have never been part of the analysis before, but which affect disease prevention and control.

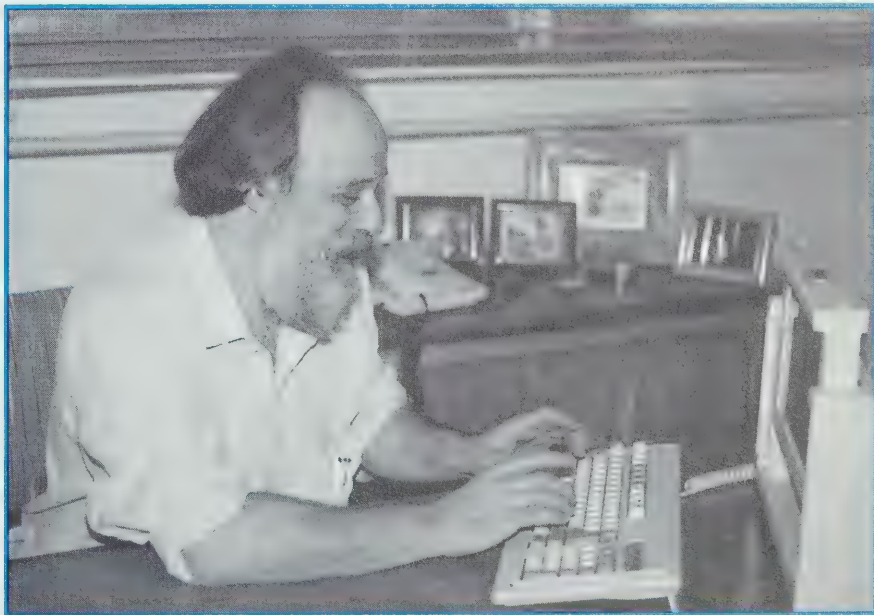
For example, malaria is linked to such factors as climate, the amount of water in a given area, and devastation of forests. "If there is forest, that means men are not close to bodies of water where the insects breed, and the insects will contact animals instead of humans," says Professor Fernando Infantosi, a senior researcher with the project. "During the process of deforestation, when there are more people around, the disease can spread a lot."

This is also true of mining regions. "Miners are very exposed and the probability of getting malaria is extremely high. In some regions in the northern state of Rondonia, 80% of the population has had malaria at least once," he says.

IMMEDIATE ANSWERS NEEDED

The SIG-MALARIA software also helps planners by providing comprehensive, reliable malaria data at the regional level. "Local people don't have the tools to process data," says Infantosi. "So the main idea of this project is to try and develop an instrument that can be used locally in the field, in one municipality, one that is user friendly and will provide the people working there with immediate answers about their data — for example, is the disease on the increase, and if so, by how much? — so they know whether to be on the alert for an epidemic and take action."

In the past, SUCAM's painstakingly-collected data from regional centres was often wasted. Test results recorded on paper can move very slowly from one level of authority to



Prof Fernando Infantosi leads the research in biomedical engineering that developed computer software for malaria surveillance.

GLOBAL STRATEGY FOR MALARIA CONTROL

The malaria control project in Brazil is just one of several projects supported by IDRC which address feasible and sustainable approaches to malaria control. The IDRC-supported projects reflect a renewed worldwide interest in fighting the spread of malaria.

At an international conference on malaria in the Netherlands last October, participants representing 102 member states of the World Health Organization (WHO) unanimously adopted the world declaration on the control of malaria.

The declaration is intended as a blueprint for action in the 1990s for a partnership of malaria endemic and malaria free countries.

Malaria, which for many years was at the centre of attention in the international public health community, lost its "high profile" in the 1970s and 1980s. Other diseases such as AIDS became the focus of attention. Nevertheless, the scale of the malaria problem has grown in the past two years. Its control has been complicated by an increase in the parasites resistant to medication, even to relatively new medicine such as mefloquin.

The final conference documents stated that malaria constitutes a major threat to health and blocks the path to economic development for individuals, communities and nations. Almost half of the world's

population is at risk from the disease, which causes 100 million clinical cases and over 1 million deaths each year.

While over 80% of malaria cases and deaths occur in Africa, malaria is a problem in every region of the world. It affects young and old. Social, political and economic changes all contribute to the worsening malaria problem, particularly through large scale uncontrolled population movements and ecological disturbances. Environmental changes brought about by development often create conditions favourable for malaria transmission.

the next. When they would finally arrive at the Ministry of Health, they were too late to be of much value for either regional or central action, or for planning.

Malaria control in Brazil over the past three decades has been a two-pronged strategy: field sanitation technicians visit outlying communities, spraying insecticides, taking blood samples and treating persons suffering from malaria. Each community has a health office where people who suspect they are infected can come for an examination. The office is usually the home of an educated volunteer in the community such as a teacher, who has been trained to take blood samples and evaluate the results, which are then reported to SUCAM.

Adding the software to this equation means better control of malaria and fast epidemiological analysis, says software researcher Marcia Macedo, a post-graduate student in biomedical engineering at UFRJ. Each municipality will have a microcomputer, so SUCAM employees can enter data as it comes in from the field. The program will provide municipal SUCAM workers and central planning authorities with quick access to reliable data, presented on two-dimensional color maps and graphs.

In response to user queries, the program can provide information about incidence and location of cases of malaria in any given time period, as well as information on which of the three different types or combination thereof is prevalent in a certain region.

With later refinements, the software will provide sequential monthly maps to estimate flareups and the movement pattern of malaria using past data and variables such as

geographical features, climate and demography. This way, malaria workers will be warned of possible epidemics, giving them time to begin epidemiological observation in communities in danger of an outbreak, or preemptive spraying to create a barrier to the disease's spread.

The northeastern state of Tocantins, west of Bahia and north of Goias, was chosen as the prototype of an endemic region for the system's development. Software was created using two kinds of data from this area. First, detailed geographical maps of Tocantins provided by the Ministry of Health were digitized using a computer language C (easily transferable to other computers), and entered into the program. Then data collected in the field in Tocantins from 1980-1984 was entered (a starting point for data that will later span from then up to the present), providing data such as the age and sex of the person who was infected, and the type of insect and malaria found.

The next step was to link the non-image malaria data with the images to create the program's detailed color maps, graphs and charts of malaria information.

Phase two of this project, begun in early 1993, has two main aims: first, to focus mainly on field evaluation and refinement of the system at the local health care level, and secondly to attempt to adapt the software system to a proposed malaria control project in another endemic situation, Sri Lanka, as a first step in a potentially larger network.

FIELD EVALUATION

The software has just begun a six month field test, to be carried out in Porto Nacional, a city of 80,000 people located on the Tocantins River and comprised of separate

neighborhoods with about 200 people each, which makes it manageable to study. Each set of monthly data is being examined in two ways: first, an overall analysis of all data; then a look only at less populated areas, excluding cities and large towns with higher numbers that would interfere with analysis of these smaller regions.

After the field test and evaluation are completed, improvements will be made to the software for the final version that will be implemented in SUCAM regional offices. Then researchers will begin various epidemiological studies — examining malaria incidence related to risk factors and demography, for instance — to assess how the software's use has improved disease control.

ADAPTING TO OTHER SITUATIONS

While the software promises to greatly improve the ability of Brazilian health planners to deal with the high priority of curbing malaria, the UFRJ researchers are well aware of its wider application. It could be used with other diseases, as well as in any

country that has the environmental and malaria data to plug in.

Many tropical countries have little or no malaria control strategy. This software aims to provide a low-cost, simple, comprehensive way to help communities plan malaria control and prevention strategies, thus removing a serious obstacle to development.

During phase two, Brazilian and Sri Lankan researchers will collaborate on ways of adapting and implementing the system in Sri Lanka.

"One of our objectives is to make the software for general applications, using geographical information systems for the control of disease epidemics," says Macedo. "We are not just trying to collect data on malaria, but are trying to create a database for use with other diseases. We plan to use geographical information systems to study the spreading of diseases here and in other countries."

Kirsteen MacLeod in Brazil.



SUCAM field sanitation technicians travel to outlying communities with malaria blood testing kits and spraying equipment.



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WATER OF LIFE

It's a typical dry, scorchingly hot afternoon in the small village of Kafr Shanawan, located about 30 km north of Cairo in Egypt's Lower Nile region. Local women congregate around the canal that crosses the community and diligently wash dirty pots and dishes. Clothed in bright, long dresses and head veils, they talk as they work, occasionally laughing at children playing in the water.

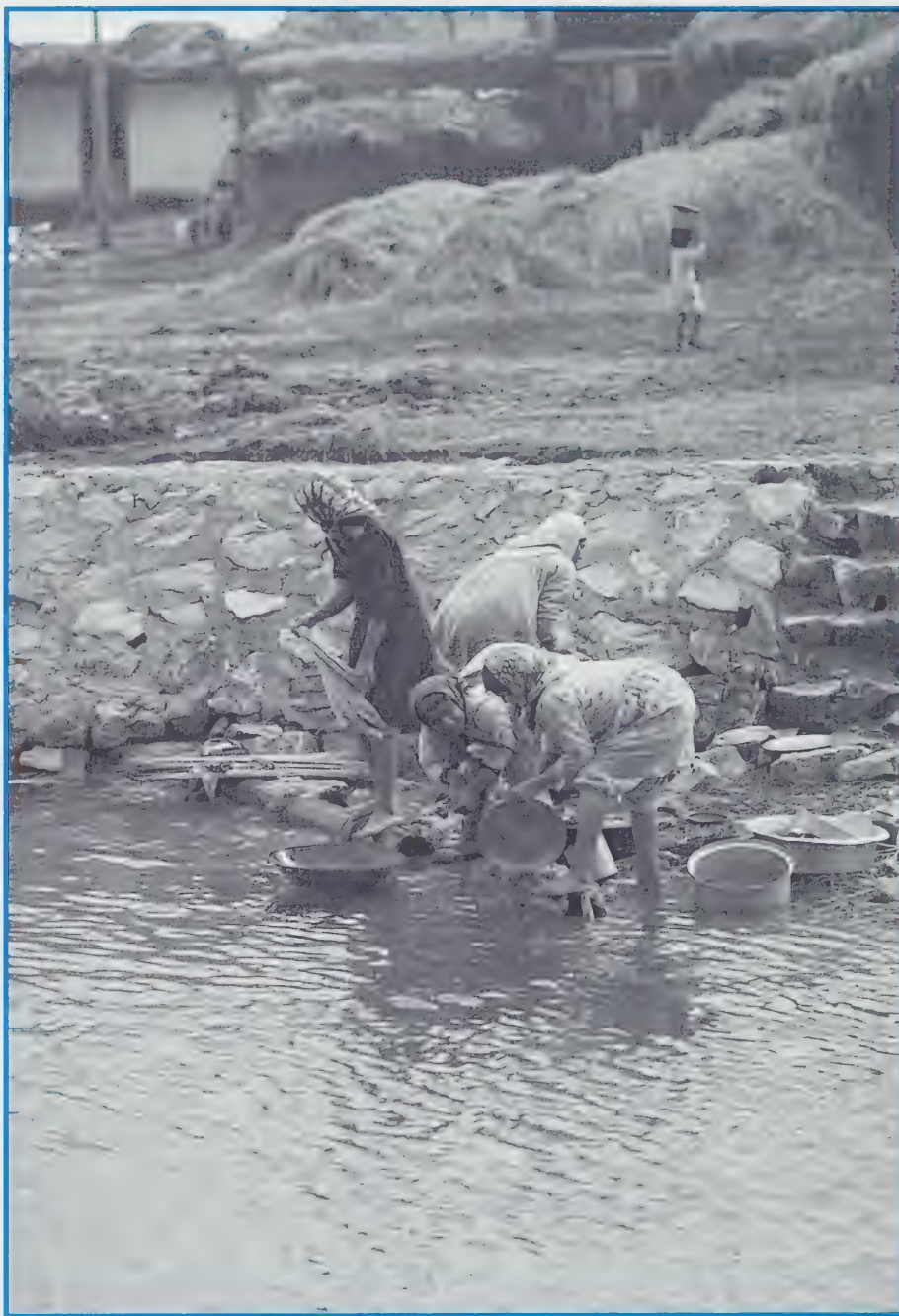
Underlying this seemingly routine situation are very real problems that face most Egyptian rural communities: poor water sanitation and unhygienic personal practices.

The canal water in which the children wade is stagnant and fetid. Villagers not only wash dishes but sometimes dispose of sullage (dirty water) and septage (urine and stool) in the same canal where children swim in the hot summer months. The water is highly infected with bacteria and parasites that can result in water-borne diseases like bilharzia.

And the canal is only one aspect of village sanitation problems. Just a few metres away, animals roam around the houses, living in the same immediate area as humans and frequently transferring diseases and parasites to occupants. The lingering stench from the animals only adds to the sharp smell of the latrines, which are rarely built with proper ventilation or storage capacity.

Food is generally prepared and cooked on the dirt floor in the adobe or red brick houses and villagers irregularly wash their hands before or after meals. This combination of poor hygienic practices with an unsanitary environment can lead to the transmission of faecal-oral diseases such as dysentery, viral hepatitis and gastroenteritis.

The issue of water and sanitation is not restricted to Egypt either. Reports from the World Health Organization



Egyptian women play a key role in household water collection, storage and use. Therefore, their participation is vital in efforts to improve hygiene.

(WHO) in the mid-1980s estimated that as much as 80% of all diseases in developing countries are related to unsafe drinking water and inadequate hygiene.

DYNAMICS OF HYGIENE

Since 1985, an IDRC-funded project has been addressing this issue, trying

to understand the dynamics of rural water sanitation and general household hygiene in the two Northern Egyptian villages of Babil and Kafr Shanawan. Headed by researcher Mrs. Samiha El-Katsha of the Social Research Centre at the American University in Cairo, the study was designed to pinpoint specific prob-

lems and empower villagers, especially women, with the knowledge to develop sustainable solutions.

According to Mrs. El-Katsha, this research has required a great deal of groundwork. "There has never really been any study of rural water supply and management techniques in Egypt," she says. "We had to start from scratch and see what was really preventing effective hygiene and sanitation."

An essential part of this research was the understanding that women play a key role in household water collection, storage and use. "Because the woman, as mother and housekeeper, determines the appropriate hygienic use of water, her participation is vital in any efforts to halt the cycle of infection, especially for diarrhetic illnesses resulting from the faecal contamination of foods and household water," says Mrs. El-Katsha.

The research team was eager to increase awareness in village women and children of the relationship between hygiene, water use and disease. Mrs. El-Katsha and her colleagues devised health education programs and used specially-selected health promoters in the village to teach women and children about hygiene. Their most basic message to the villagers was that they were part of both the problem and the solution.

"In these villages, where many of the women are illiterate, there is little knowledge of the link between unsanitary conditions and disease," Mrs. El-Katsha says. "We had to teach them in very clear and basic terms how interconnected the processes were."

Specifically, this involved a number of different methodologies and objectives. The research team trained more than 85 nurses, teachers and informal village leaders on how to impart basic health messages to women and children.

Existing health structures within the village were also used for hygiene promotion. Nurses in both Babil and Kafr Shanawan organized health education sessions for women who were bringing their children in for immunization. Teachers ran summer education programs where village children learned about hygiene and health through short skits and arts and crafts. In Kafr

Shanawan, informal leaders conveyed health information to women who approached them at their homes for help or advice. Often, these informal leaders would observe unhygienic practices and suggest alternative methods of water sanitation.

GREATER AWARENESS

In all, these health promoters reached out to 712 households in Babil (15% of total population) and 322 households in Kafr Shanawan (8% of total population). Researchers evaluated changes in behaviour and retention of information in these households to see if their efforts resulted in better personal hygiene. In key areas such as water storage, food preparation, latrine upkeep and hand-washing, those households approached by the health promoters showed greater awareness of water sanitation issues and practised better household hygiene than those villagers who were not exposed to the research study.

"This increase in information retention and general awareness was an important step," says Mrs. El-Katsha. "But we realized we needed to do more." In this case, "more" meant realizing that it would be impossible to change hygienic practices related to environmental sanitation without improving the village surroundings. Researchers wanted to make sure they saw the forest as well as the trees.

They examined the major sources of water in the villages: wells and tanks, public standpipes, house connections, privately-owned handpumps, and irrigation canals. After doing tests based on both laboratory work and observation, Mrs. El-Katsha and her colleagues concluded that the villages suffered from the pollution of most water sources, poor maintenance of most water sources (especially storage tanks), unsatisfactory disposal of solid wastes and an ineffective sewage system, if there was one at all.

Both villages had similar environmental problems but in differing degrees of severity. In Babil, the priorities were to fix a standpipe used to distribute well-water and create a garbage collection system. While these problems also existed in Kafr Shanawan, the main problem there

involved lowering the water table, which often rose to just one metre below the surface. Identification of the problems was the first step: next came the hard part of working toward solutions.

Some solutions that worked involved bringing PVC handpumps into Kafr Shanawan and fixing a standpipe in Babil. The testing of the Malaysian-made PVC handpumps allowed those villagers in Kafr Shanawan who lived far from water sources to have increased access to potable water. Villagers were eager to learn how to maintain and repair the pumps. Meanwhile, a group of women in Babil organized themselves and approached their representative on the village council for help in repairing the public standpipe. With some materials and supervision, they were able to fix the pipe, which is still in use today.

Other measures were less successful. A garbage collection system in Babil was shelved after only three months owing to administrative problems. Similar failed initiatives brought to light the thorny issue of community participation. "We learned in the process of trying to improve village surroundings that peoples' participation can be blocked by many extraneous factors," Mrs. El-Katsha says. "The relationship between government agencies and villagers was one of these factors."

COMMUNICATION GAP

Lack of communication between levels of government and cumbersome bureaucratic procedures were major obstacles in the path of improved sanitary conditions. The three levels of government in Babil and Kafr Shanawan — governorate, markaz (county) and village council — all share general responsibility for village sanitation but researchers noted little coordination of efforts. The result was, and still is, a considerable gap in communication between the levels of government and the villagers themselves. Many villagers complained of not knowing who to turn to for assistance in bettering sanitary conditions — others were sceptical about any response from village or regional governing bodies.



The irrigation canals in Egypt are among the major sources of water for village residents. Many, though, are polluted or poorly maintained.

This scepticism sometimes led to apathy. When researchers first went to the village of Babil, they investigated the problems of pollution and garbage strewn around public standpipes. The response from one villager seemed to encapsulate attitudes in the community: "the government is the one responsible for it." A willingness to put responsibility for village sanitation in the hands of the "government" is a significant constraint to community participation, Mrs. El-Katsha says.

PARTNERSHIP MODEL

But she views cooperation between government agencies and health promoters and active villagers as a crucial means of improving the environmental conditions in Babil and Kafr Shanawan. "We have to develop a new model of cooperation and participation when it comes to village health and hygiene issues," Mrs. El-Katsha says. "This model should be based on a partnership between decision-makers, administrators, and villagers that will enable them to communicate and work toward the same goals."

Although this goal is an ambitious one, the project has laid the groundwork for its achievement. With the project's conclusion, researchers have left the villages of Kafr Shanawan and Babil but they have also left behind the ideas of community participation and individual responsibility. The creation of village committees on environmental issues and the increase in villagers' awareness of personal hygiene have given project researchers hope that solutions to health problems will be sustained by villagers themselves. Mrs. El-Katsha's vision for the future of Babil and Kafr Shanawan is simple: the continued practice of personal hygiene, an awareness of environmental conditions and the willingness to participate in decisions about health and sanitation. This may or may not happen, she warns, but one thing is clear: many of the villagers now have within themselves the knowledge and ability to make many of their own decisions about water, health and hygiene.

Craig Harris in Cairo



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ISRAELI AND PALESTINIAN WATERS: ECONOMICS, ECOLOGY AND EQUITY

For most of recorded history, conflict in the Middle East has revolved around water more than land or even oil. Consider how many of the stories in Genesis focus on water; similarly, more than 40 references to water can be found in the Koran.

Most of the region's main rivers cross international and ethnic borders, challenging successive peoples and governments to share water. Recent history is no less contentious, particularly so in the land shared by Israelis and Palestinians. With respect to water disputes, I distinguish three inter-related issues: the classic one of water quantity, the newer one of water quality, and geopolitics, an issue both new and old.

Today's challenge is not simply to resolve the historic problem of water scarcity in an arid region but to do so with economic efficiency, ecological responsibility, and political equitability. Attention to one dimension alone is unlikely to be helpful.

In analyzing these issues, the word "crisis," favoured by popular writers, may be closer to the mark than describing the situation as "chronic," the typical practice of academics. "Chronic" understates the urgency of conditions in which nations are heavily armed, urban dwellers depend on piped water systems, huge quantities and varieties of pollutants contaminate water courses, and rapid rates of population growth and economic change are endemic.

While conflict over water exists in many places in the Middle East, nowhere is the conflict sharper than in the Jordan River Basin shared largely by Israel, the West Bank and Jordan, with Syria and Lebanon also having some rights. It is in these areas that demand and supply are most seriously out of balance. Moreover, much of the water consumed in Israel originates in aquifers that rise on the West Bank — land that may ultimately be controlled by Palestinians, a factor further contributing to crisis.

ECONOMIC CHALLENGE

From the moment humans first placed a few stones to direct water toward crops, supply augmentation has domi-



Salt water from the Gulf of 'Aqaba flows underground and contaminates overused supplies of fresh water.

nated discussions about water. Only in emergencies does conservation take priority. Typically, much more attention is devoted to increasing supply than to reducing demand.

It is time to shift emphasis to the demand side of water management. The energy crisis taught us that we are likely to close the gaps between water demand and water supply more easily, cheaply and safely by reducing use than by increasing delivery.

Middle East nations already use water relatively efficiently. The problem, to quote Thomas Naff, is "that they are not as efficient as the crisis and the scarcity requires them to be." In Israel, for example, water policy clearly answers to agricultural policy. Farming accounts for about 70% of all water use in Israel, including saline and recycled water. This water could be used to far greater economic gain in other sectors of the economy. Considerable volumes of water should be reallocated from irrigating crops to industrial and household uses, or simply left unpumped to protect the aquifers.

Water is expensive because even conventional water supply systems are capital intensive, especially per dollar of revenue. The Jordan River Basin is not more arid than other parts of the region, but rainfall varies sharply from place to place and season to season. Hence, extensive systems must be built to gather and deliver water. As well, Israel and Jordan each use about one-fifth of their electricity just to pump water. Alternative systems are still more capital intensive, especially desalination. Desalination takes enormous quantities of energy, and even with low oil prices, costs to consumers would have to be two to five times current levels. Still, the idea survives in the form of megaprojects such as canals linking the Mediterranean and Dead Seas or the Red and Dead Seas. Such plans are questionable on economical and environmental grounds, especially before exploring demand-side measures.

Alternative analyses of energy — dubbed the "soft energy path" — that came out of the energy crisis of the 1970s have lessons that can be applied to the water crisis of the 1990s. Soft energy analyses focus on the *services* provided by energy, not on *delivery* of the commodity itself. The question then becomes how each end use or service can be most efficiently satisfied.

In marked contrast, conventional wisdom focuses on ensuring adequate supplies to meet present and future energy (water) demands. This perspective betrays outmoded doctrines of consumer sovereignty and the insatiability of human needs. It treats demand as being divorced from the policy process, a "given" that must be satisfied by ever greater supply.

The soft path stands the conventional approach on its head. Analysis starts with end uses, not sources of supply. This reversal forces a bottom-up rather than top-down view. Now, conservation and efficiency are not merely unfortunate necessities but rather the touchstone of rational resource planning.

Of course, the analogy between energy and water is not perfect. Among other things, water lacks the direct linkage to thermodynamic constraints; except for hydropower, supply does not vary from year to year; and direct use is more important than indirect. Nevertheless, enormous oppor-

tunities present themselves to maintain excellent standards of living with lower consumption of water. For both water and energy, the amounts actually needed to support a comfortable life are only a small fraction of total consumption. The lesson for Israel and the Occupied Palestinian Territories is that the largest, safest and cheapest "source of supply" for water is likely to be found through conservation in existing uses, mainly in irrigation water.

ECOLOGICAL CHALLENGE

A second element of the soft energy approach is to devote as much attention to conserving quality as quantity. All Middle Eastern countries have a wastewater problem, and one that links directly to water supply. The examples are numerous. Dumping of wastewater is common, directly into water courses or dry river beds. At the next rainfall, the wastewater seeps into the aquifers. Per hectare use of pesticides and fertilizers in Israel and Jordan is among the world's highest, and run-off is equally high and unregulated. As one result, nitrate concentrations (augmented by sewage effluent) in the Coastal Aquifer could eventually make the water unacceptable for irrigation. Olive oil mills, an otherwise excellent way to increase farm income and provide rural employment, release a black liquor that depletes the oxygen content of waters into which it seeps.

Although nations sharing the Jordan River are among the world leaders in recycling sewage for agricultural use, most of the re-used water receives minimal or no treatment, and much of it contains excessive quantities of chemicals. Industrial contamination of surface and groundwater can also be assumed to be serious, even without regular testing. Spot checks in Israel show concentrations of solvents, petrochemicals, gasoline products and other contaminants at levels well above those allowed in other industrial countries.

The short coastal rivers are the most seriously degraded ecosystems in Israel. Their flows are greatly reduced because the springs that fed them have been diverted to the National Water Carrier. These diversions remove the flushing effect of a stronger flow, worsening conditions in rivers such as the Kishon in Haifa, which, according to one source, receives 10 thousand cubic metres daily of industrial waste water. Parks along its banks are now considered dangerous to health.

Some exceptions relieve the generally dismal picture of water quality in Israel. Lake Kinneret (the Sea of Galilee) is managed under a unified plan that prohibits dumping and restricts the uses of water from the lake. As a result, Kinneret retains its quality, its beauty and its tourist income. The Yarkon River in Tel Aviv is the test case in a physical and economic feasibility study of rehabilitation to a level that would permit recreational use.

Water quality and water quantity are positively linked. Conflicts between economics and environment that arise so commonly when approached from the supply side are typically lessened or eliminated when approached from the demand side. For example, efficient irrigation reduces the risk of soil salinization, and low-flow toilets and showers cut wastewater flows into sewers. By and large, policies that promote more economically efficient use also support environmental protection.



Lentil crop in Syria. Although Middle East nations are already relatively efficient water users, the crisis requires that they be even more efficient.

GEOPOLITICAL CHALLENGE

How many times have we seen projections for water that show increasing deficits between water use and water availability! As a way to identify short-term problems and to adjust operations in water utilities, forecasts have their place. But as a way to determine policy options, they are seriously inadequate or misleading.

Turning a final time to the soft energy alternative, it substitutes "backcasting" for forecasting. Forecasting begins from the present and tries to determine the future. Backcasting begins from the future and works back to the present. In a water backcast, one defines in detail a future water economy, and then analyzes whether there is a feasible and acceptable path between the present to that future. In the case of energy, traditional forecasting always called for greater supplies. However, backcasting indicated the option to maintain consumption at the same level or even cut it. Actual energy use turns out to be much closer to the patterns suggested by the soft path than by traditional analysis.

Approaching water problems through a soft path approach could work to reduce conflicts between Israelis and Palestinians. Because it is concerned with how desirable futures can be obtained, backcasting is explicit about its subjective goals. It has none of the pretensions to objectivity sometimes claimed by forecasting. This feature makes it an ideal partner for political science in a search for regional cooperation and accommodation. All sides see close linkages between water availability and national political and economic security. It is therefore only through the exploration of alternative futures, not simply a projection of the present into the future, that we will find ways to minimize conflict.

CAUTIOUS OPTIMISM

The Jordan River Basin is clearly an area of water stress. The best approach may well be to treat quantity and quality issues together, and to recognize that neither can be

achieved without explicit recognition of mutually shared rights and responsibilities for management. Indeed, this was the principal message of the Brundtland Commission. Sustainable development is not just a matter of economics and ecology; if it does not also incorporate equity, it will fail.

The current water economy and water policies in Israel and the Occupied Palestinian Territories are coming into question sharply because they have been used to the severe and evident disadvantage of Palestinians, and even work to the less evident disadvantage of Israelis themselves. With the parallel bilateral and multilateral tracks of the current peace process, we may at last be witnessing Rothman and Lowi's iterative process "by which progress beginning at the political process — that is, the Arab-Israeli peace process — requires concrete progress at the practical level — for example, sharing water resources — for both consolidation and fruition." There are grounds for cautious optimism. Economy, ecology and equity may indeed be joined around water issues in the current negotiations.

This article is an abridgment of the keynote address by Dr David B. Brooks at the First Israeli-Palestinian International Academic Conference on Water in Zurich, Switzerland, in December 1992, organized by the Truman Institute for Peace at Hebrew University and the Jerusalem Center for Strategic Studies (MAQDES), a Palestinian organization. The conference was sponsored by IDRC and several other organizations. Dr Brooks' address is based on a monograph, co-authored with Stephen Lonergan, to be published by the Institute of Sustainable Regional Development, University of Victoria, British Columbia. Dr Brooks is Program Director, Environment and Technology, IDRC.



THE MEKONG: FROM TIBET TO THE SOUTH CHINA SEA



The Mekong is Southeast Asia's longest river. It touches six countries before reaching the South China Sea.

Mekong — the word evokes images of rice fields, memories of war. Many recognize the river's name, but few people outside of Asia realize its international character or the important role it is destined to play in the development of the countries along its banks.

The world's twelfth longest river rises in the distant Tibetan plateau, five kilometres above sea level. For almost half its 4,880-kilometre journey it tumbles through the dramatic gorges of China's Yunnan Province. Tempered by its 4,500 metre descent, it winds southward to border Burma, Laos, and Thailand. Finally, the great river flows through Cambodia and the south of Vietnam, where it divides into the fertile fingers of the Mekong Delta to be swallowed by the South China sea.

During the long decades of war and isolationism in Southeast Asia, the Mekong served the simple needs of the peoples of all six nations along its banks. With peace in the region, most countries along the Mekong are scrambling to catch up with their more

developed neighbours. Development could mean hydroelectric power, irrigation for farms, fish for the markets and access to river transport for trade. Suddenly, all eyes are on the Mekong.

The Mekong has no major cities or industries, nor a single dam or bridge on the mainstream. The fifty million people who live along it are among the poorest in the world. But development, even a small dam or factory, could have a significant impact on people living upstream or downstream.

Developing an international river is a complicated business. Damming sections of the Mekong, deforesting certain watersheds or building factories would have an enormous impact on the downstream populations that rely upon it for irrigation, fishing, transport and drinking water. With so many people directly dependent on the river and millions more weighing the costs and benefits of future hydroelectric and irrigation projects, the Mekong's development will require unprecedented regional cooperation and planning.

The Law of the Sea governs the world's oceans, but there is no parallel international law to monitor freshwater systems. Nor was there a forum

for all of the Mekong's six countries to meet and identify the issues regarding Southeast Asia's longest river until Canada brought them together in 1991.

IDRC's role as catalyst in the establishment of the Mekong Research Network is historic. Only a few years ago, regional cooperation on this or any other scale seemed impossible. Persuading the six countries to join in discussions was a remarkable achievement in itself.

Canada was perhaps the ideal country to bring the Mekong countries together. As a nation with no political axes to grind in Asia and respected throughout the region, Canada was probably the only G-7 member acceptable to all the countries involved. The endorsement of Canada as the catalyst in the Mekong Network made IDRC's task much easier.

The IDRC initiative built upon an existing effort to bring together the four countries of the lower Mekong (Thailand, Laos, Cambodia and Vietnam). This formal "Mekong Committee" was set up in 1957 but the Khmer Rouge withdrew Cambodia in 1975. An interim committee kept the three remaining countries working together until a new agreement regrouping all four countries was signed in February.

IDRC sponsored a planning seminar in Bangkok in 1991. The participants agreed to establish the Mekong Development Research Network (MDRN). The non-governmental organization met for the first time in May 1992. Its primary objective is to provide a new forum for cooperative effort among the Mekong countries so that water resources can be better utilized and the Mekong ecosystem better preserved to improve the quality of life for the peoples along its banks.

All six participants agreed that the top priority must be preserving the ecosystem and preventing water pollution. It was recognized that the Mekong is a common resource that must be harnessed collectively, and that this cooperation would contribute to the peace, stability and prosperity of the Mekong countries.

By keeping the Network informal and non-political, IDRC hopes that the people living along the river can be

treated as one community rather than as a collection of national and political entities. Focusing on research issues instead of official ones may help cut some red tape. Ideally, consensus at the NGO level will generate feedback to policy makers and bureaucrats.

The MDRN is IDRC's most challenging, complex and ambitious undertaking to date. The six countries have no tradition of working together. In fact, their agendas are widely divergent.

Thailand, the most economically advanced of the Mekong countries, will see its electricity requirements double between 1988 and 1996 to 11,066 megawatts. It is eyeing the Mekong to irrigate the arid northeastern province, which contains almost half the country's arable land.

The amount of irrigated farmland in Cambodia has fallen by 80% over the past 20 years. Its irrigation systems have been largely destroyed by the war. The north of the country has enormous hydroelectric potential, yet its cities still rely entirely on fuel-driven generators for power.

About 50% of the lower Mekong's hydroelectric potential is located in Laos, which is the country least able to utilize

it. Only about 1% of Laos' 800,000 hectares of arable land are irrigated.

In the decade since 1980, Vietnam has doubled its rice production to about 10 million tonnes and became the world's third largest rice exporter in 1990. The crop, grown in the Mekong Delta, could be compromised by upriver diversion. And since opening its borders to foreign investment and industry, Vietnam expects its electricity requirements to increase dramatically in the next few years.

China's Yunnan province regards the Mekong as a major link between its diverse ethnic minorities. Underdeveloped and isolated, Yunnan plans to harness the river to provide power for the province's industrial development.

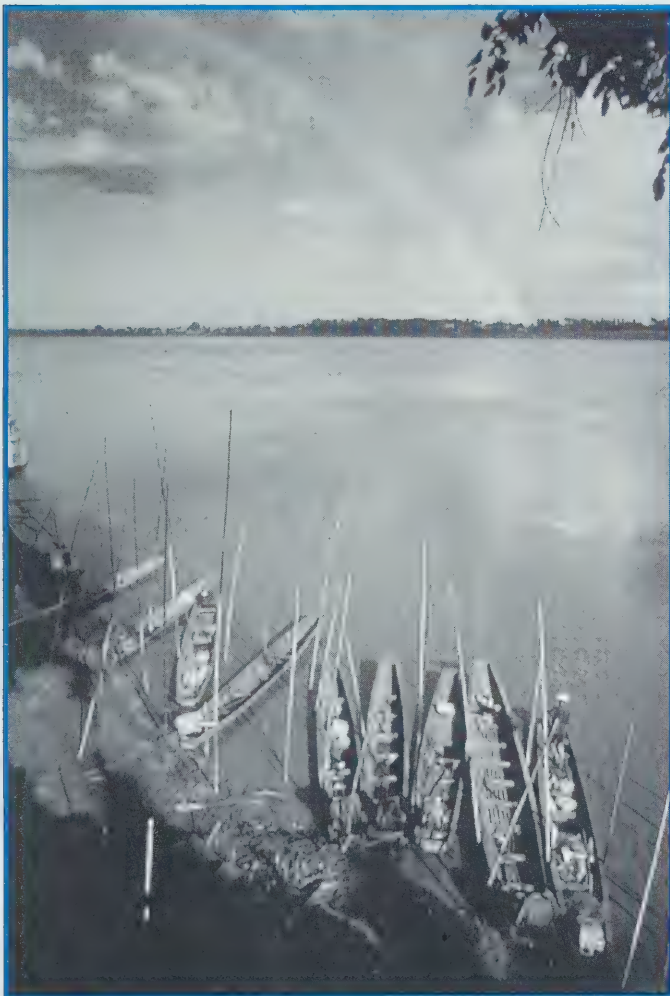
All six countries have identified the need for dams for irrigation and hydroelectric power. But dams displace people and wildlife, and drown forests. An increased electricity supply attracts potentially polluting industry. Perhaps most importantly, development of the river will have an immediate impact on the local populations while most of the benefits will go to distant cities.

The MDRN is undertaking a state-of-the-art survey of the Mekong mainstream and its tributaries to identify research, development and preservation activities. Research will soon begin on trade and tourism potential, which could result in higher living standards and increased employment alternatives for the riparian people. Subsequent studies will target environmental issues.

Waterway transportation also merits study. The Mekong is navigable from the Delta to Khone Falls near the Lao-Cambodian border, and north of the Falls through much of Laos to South Yunnan. Two thirds of Laos' foreign trade crosses the Mekong from Thailand every year. An Australian-funded bridge across the Mekong between Thailand and Laos will soon be built.

IDRC's ambition is to build bridges of common interests and understanding. With Canada's support, the six countries along the Mekong River are moving toward resolving concerns that have until now hindered regional cooperation. They recognize a unique opportunity to develop their shared resources for mutual prosperity and improve the lives of the 50 million people who live and work along her banks.

Catherine Wheeler in Singapore



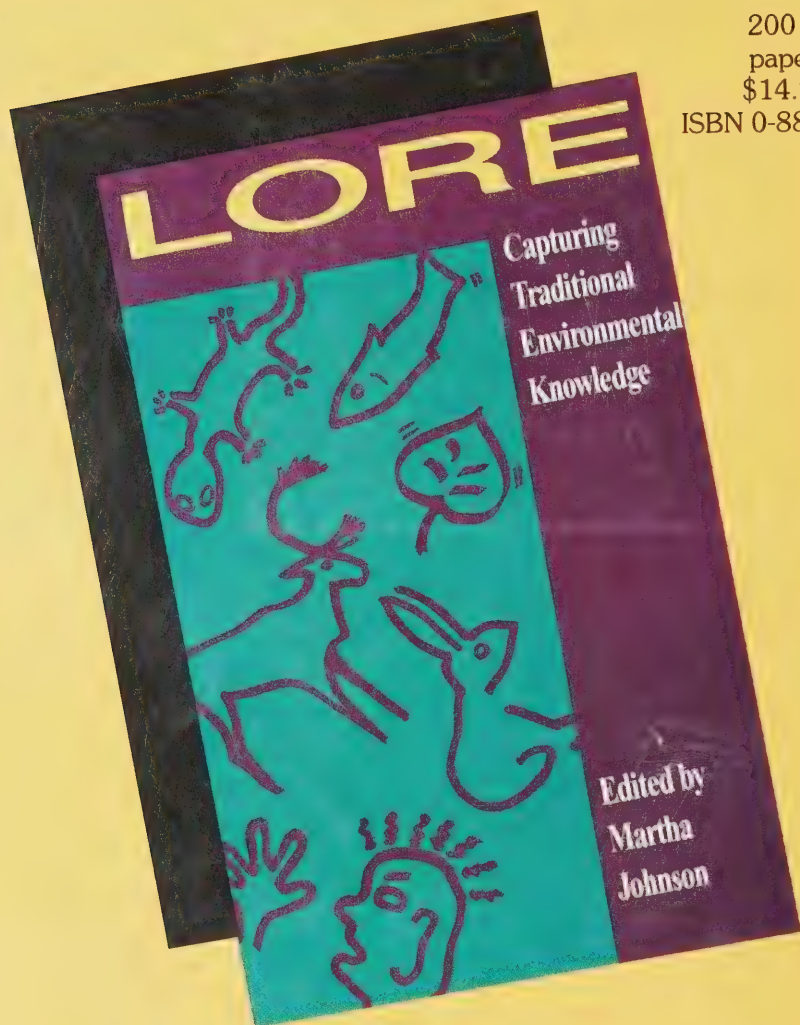
Fishing and river transport along the Mekong will need to be protected from the impact of new development such as hydro-electric projects.

LORE

CAPTURING TRADITIONAL ENVIRONMENTAL KNOWLEDGE

EDITED BY MARTHA JOHNSON

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**Canadian Collaboration
for Development**

IDRC REPORTS

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FOCUS

This special issue of *IDRC Reports* features an array of projects which are the fruit of collaboration between researchers in developing countries and their colleagues in Canada.

For over a decade, IDRC has supported projects that involve a research partnership between institutions in developing countries and Canada. Southern researchers combine their expertise with that of Canadian counterparts to pursue common objectives in domains as far-ranging as fisheries, fiscal reform, control of schistosomiasis and AIDS, building materials and monitoring human rights.

The process of collaboration and information-sharing works both ways. For overseas project leaders, it can mean access to new techniques and technologies, training and valuable perspectives on development problems. Another desirable outcome often proves to be strengthened research communication across the South.

Collaborative research can produce results with important applications in Canada. Canadian researchers also find opportunities both to contribute to solving development problems and broaden their own professional capacities, whether it is their first venture into the developing world or part of a longstanding involvement.

E. Conway
Editor-in-Chief

IDRC's Nairobi office has moved to Liaison House, State House Avenue. Tel: 713160-1, 713273-4, 713355-6, 713578-9, 713690-1, and 713699. Fax: 711063. The mailing address remains: Regional Director, IDRC, P.O. Box 62084, Nairobi, Kenya.

REPORTS

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Gilles Drouin (page 25); John Eberlee (pages 15, 16, 18, & 27-31);

André Lachance (pages 9, 13 & 32); Peter Newton (pages 6-8, 10, 11, 19-24, 26 & 35); and

Pierre Thisdale (pages 14 & 17).

IDRC: Denis Sing



*Rapeseed fields near
Fujian, China*

THE SIGNIFICANCE OF COOPERATION

IDRC was founded on two assumptions: that research — the generation, dissemination and application of knowledge — is fundamental to sound development; and that without the capacities and resources to do its own research, the South would never truly control its own development.

Framing both assumptions is the belief that just as development is necessarily a mutual enterprise, so too should be the research that informs it. IDRC regards the South not as recipient of research assistance, but as co-owner of the research process.

The distinction is subtle, but key. The North has knowledge, research skills and technologies, dissemination systems and training institutions from which the South can benefit and to which it is entitled access. Critical for IDRC, however, has been the definition of these resources not as technical assistance but as cooperation. While IDRC's application of cooperation has

shifted over time, its belief that collaboration is *the* necessary underpinning of sustainability and equity in development has been constant.

Cooperative research, and technical assistance to research, define two quite different relationships between North and South. Technical assistance implies a "deficit" model and aims at "filling a gap." It provides someone's answers to someone else's needs. The interaction tends, therefore, to be linear from supplier to receiver, and time-bound. Most significantly, technical assistance expects only the "developing" side to accommodate and change through the experience. Inappropriate research results can leave the recipient with the problem unsolved or exacerbated, frustrated by unmet expectations and the loss of time and resources.

Cooperation, on the other hand, defines a relationship of equals. Both partners expect to change; both recognize the relevance of the undertaking to their own context and take responsibility for facilitating application of results in that context. Collaborative research does not demand equal

capacities or identical interests. On the contrary, it expects that contextual differences will enhance the scope of the analysis. Recognizing that the problems and processes of development are not rooted solely in the South, collaboration begins with negotiations as to what the questions are. It works toward realizing the goal of *joint ownership*.

In this respect, collaborative research often anticipates a more fully "developmental" impact than do single-site projects. Participants expect a *sustained* period of intellectual exchange and mutual learning. Such projects are in themselves forums for capacity-building as both sides negotiate, communicate and adapt. Particularly where a developing research community is weak, collaboration has value in mitigating risks of both the wrong answer and an overly directive outside agenda. It provides the basics of reciprocity and self-determination: time and tolerance; questions before answers; preference for creative syntheses, for fairly representing both sides.

HOW COOPERATION BEGAN

The Act establishing IDRC formally recognized the merit of enlisting Canadian scientists in carrying out the Centre's mandate. Initially, this recognition was practiced most graphically by the Agriculture, Food and Nutrition Sciences Division, which located program staff in selected Canadian research centres. The goal was to reduce bureaucracy and take advantage of regular interaction with Canadian expertise in newly emerging fields relevant to developing country research agendas.

This period was critical for IDRC in affirming credibility with both North and South. Southern research communities valued the control of their own project activities and access to Northern expertise. For Canadian faculty and students, it was a period of interactive development education. Scientists assisted with proposal evaluation and technical monitoring; program officers participated in the design and delivery of courses and sponsored lectures on international development issues. Many Canadian



Among IDRC's collaborative projects is the coastal resource research network, intended to promote activity such as scallop culture, shown here, in China.

scientists set off on development careers as a result of relationships they maintained long after IDRC support.

As IDRC evolved, so too did its application of the collaborative ideal. Increasingly, linkages moved to wider *institutional* arrangements, where more sustained interaction would benefit successful project completion, particularly where a broader relationship could strengthen local research capacity.

Thus, for example, the National Research Council's Prairie Regional Laboratory in Saskatoon helped develop a sorghum and millet dehuller for several countries in Africa; the University of Manitoba assessed grain quality in collaboration with institutions in Egypt and West Africa. An early case of collaboration with the Canadian private sector was a market study by Maple Leaf Flour Mills with Nigeria, Botswana, and Kenya on grain-use and strategies for introducing new varieties. A provincial research organization, British Columbia Research, collaborated in a series of workshops in Singapore, Thailand and Vancouver on food processing technology, research in small-scale enterprises and industrial engineering.

At the same time, South-South collaborations remained the principal focus of IDRC. A critical development in both types of linkages became complementary research through *network* arrangements. Each institution undertook its own study in parallel with several others in the North and South. Researchers regularly came together to share experience and reinforce project momentum. Such multi-country, cross-regional network collaborations have proven especially successful in supporting Southern researchers to increase their ability to work on their own and as peers within their respective international research communities.

In 1981, IDRC responded to the call by the Group of 77 developing countries for increased funding for research on "jointly identified problems" by establishing the Cooperative Program (CP). The CP aimed to promote access to Canadian research strengths, create better channels of communication and technology exchange, and orient

The problems facing us are planetary in scope, such that neither Northern nor Southern researchers working in isolation can hope to create adequate responses. IDRC's notion of collaboration will continue to depend on complementary teams and the need for contributions from a variety of scientific, social and cultural settings.

Canadian research toward Southern concerns.

The CP also sought out new areas of Canadian expertise relevant to developing country issues. New openings followed with research funding in earth sciences, small and medium enterprises and building materials and technology. Projects supported by Cooperative Programs included partners from Canadian academic, public and private sectors.

In subsequent years, the separate CP allocation was replaced by a directive to ensure that 15-20% of funding went to collaborative activities. Although the Division has now been closed, IDRC's commitment to working with the Canadian community continues. Its "Empowerment Through Knowledge" policy calls, in fact, for "enhanced relationships."

IDRC's own evolution during almost a quarter century of involvement in the South has been mirrored to a large extent by a growing depth of knowledge in Canadian research centres about the vital issues of development. In many cases IDRC may have initially opened doors for Canadian specialists to their Southern counterparts and their research agenda. But in the years since, the relationships between Canadian and Southern researchers in a multitude of disciplines have taken

on lives of their own. Whether it is in AIDS research, erosion control, botanical pesticides or biodiversity, personal contacts and networks have spread around the globe.

Perceptions of development issues have also evolved remarkably over the past 25 years. Development is not simply regarded as the concern of the South, but as a shared set of priorities whose attention requires the closest of collaboration. The problems facing us are planetary in scope, such that neither Northern nor Southern researchers working in isolation can hope to create adequate responses. IDRC's notion of collaboration will continue to depend on complementary teams and the need for contributions from a variety of scientific, social and cultural settings.

Sitoo Mukerji, Director and Anne Bernard, Principal Program Officer, Program on Innovation Systems Management (PRISM).

DRAWING WATER FROM FOG

In May 1992 the Chilean Minister of Agriculture turned on a water tap in the square of the seaside village of Chungungo. The water that flowed was the result of work by Chilean and Canadian researchers who have learned how to draw water from the coastal mountain fog found in the Andes in Chile's arid, northern region.

The tap turning was part of a ceremony to thank researchers from the Institute of Geography at the Pontificia Universidad Católica de Chile (PUC) and the Corporación Nacional Forestal, along with Dr Robert Schemenauer of Canada's Department of the Environment and staff of IDRC for their work in bringing water to this parched town. The region is one of the most arid on earth.

The ceremony also signified the end of seven years of research that resulted

in the creation of cloud-harvesting technology. This process collects water from moisture-laden fogs known as "camanchacas."

MORE THAN GOOD SCIENCE

To Dr Schemenauer, the day represented more than the culmination of successful geographical and meteorological studies. "The applied part is where you really get your satisfaction. Working and talking with the people and also realizing there are a lot of places in the world where this may turn out to be an important water supply is exhilarating. It's more than good science," says Schemenauer.

He had plenty of opportunities to meet the people of Chungungo during his twenty visits to the project site to do field work and monitor progress. Dr Schemenauer first learned of the project in 1985 when he was asked by IDRC to evaluate a Chilean proposal to study the camanchacas and prototypes for fog-water collectors. It was on his advice that IDRC approved funding for the project in 1987.

FOG SAMPLERS

PUC researcher Prof Pilar Cereceda Troncoso came to Canada to observe the equipment used by Schemenauer at his two field sites in Quebec. Atop Mont Tremblant in the Laurentian Mountains and Roundtop Mountain in the Eastern Townships, Schemenauer uses special instruments to collect samples of cloud water for subsequent analysis. These small fog samplers are made of vertical teflon strings. As the clouds pass over the mountains, the fog hits the fibres, forms beads and runs down into collection bottles.

The same collectors were used in Chile to examine the quality of the fog water. Once analyzed the data proved that the mountains of El Tofo would be an ideal site for fog-water collectors.

OVERSIZE NETS

The huge fog-water collectors look like oversize volleyball nets. They are made of a locally available, double-layer polypropylene mesh. Each net is 12 metres long by four metres high and hangs two metres off the ground. The water collected from the fog runs



The fog-water collection system can supply residents of Chungungo with an average of 11,000 litres of fresh water daily.



Water from fog is collected in vertical nets made of polypropylene mesh and fed to the village below by pipeline.

down the nets and drips into gutters that lead into a 100,000 litre tank. A pipeline carries the water down the mountain to Chungungo.

The 330 residents of Chungungo used to rely on well water brought in from the nearest town, 50 km away, by an old truck once or twice a week. This supply was not safe since the same tanker truck was also used to carry other cargo that could contaminate the water. Dr Schemenauer says the fog-water is safe to drink. For good measure, the Chilean Rural Water Authority requires a small amount of chlorine to be added to the supply before it goes into the village.

Everyone involved is ecstatic over the success of the project. The original 50 collectors have been increased to 75 and are expected to produce an average 11,000 litres of fresh water daily. "Water production has been above our expectations. It's been a

very good winter season. Essentially the reservoir has been overflowing with fog-water," says Dr Schemenauer. The site at Chungungo is the largest fog-water catchment system in the world.

The success of the project has meant mountains of correspondence for Dr Schemenauer. He has been answering letters of inquiry for the last three years. IDRC plans to keep him busy disseminating this technology to other dry regions of the world. It may be especially appropriate for countries such as Cape Verde, China, Ecuador, Haiti, Peru, Namibia, Yemen, and Oman. Seasonally arid regions of the tropics may also be able to milk their own fogs using this technology.



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REBUILDING CHINESE HARBOURS

The provinces of Guangdong and Fujian are China's top economic success stories of the past decade. Their remarkable growth is due to the provinces' status as special economic zones (SEZ), the country's economic reform program, and harbours that can handle the increased trade.

China would now like this success repeated in Hainan province. The tropical island province, located off the south-west coast of Guangdong in the South China Sea, has been experiencing similar rapid economic growth over the past few years since it was named an SEZ in the mid-1980s.

Rapid growth has resulted in higher rates of trade. But the current harbour facilities can no longer meet the demand for cargo transport. Provincial officials quickly realized that major infrastructural investments were needed for the province to repeat the performances of Guangdong and Fujian. Dr Ying Wang, a scientist at Nanjing University, recognized the need to improve Hainan's existing harbours.

NATURAL FORCES

An ideal harbour takes advantage of natural forces such as tides and storms to transport sediment, thus reducing the need for costly and environmentally disruptive dredging. To best utilize these forces, Dr Wang and other Chinese researchers knew they would need critical oceanographic data and the expertise of a foreign institution in harbour improvement and maintenance.

Dr Wang found the expertise she needed from Dr Charles Schafer, a Geological Survey of Canada scientist at the Bedford Institute of Oceanography (BIO) in Nova Scotia. Dr Wang and Dr Schafer created a plan to gather the necessary marine geological data to redesign and expand several small harbours with a minimum of environmental disruption.



The port of Sanya lies close to international shipping lanes and is a key export point.

The project focused initially on Sanya and Yangpu harbours — both before the harbour modifications and while they were taking place — to define the baseline conditions.

The Chinese-Canadian team has been able to discover a pattern to the transport of sediments coming in from the ocean side and leaving from the estuary. The pattern was mapped by monitoring marine protozoans called *foraminifera* that are carried in the sediments.

With funding from IDRC, the scientists at BIO were also able to provide Dr Wang's team with a state-of-the-art microwave navigation system, equipment for a geological diving team and other tools. A reflection seismic system uses sound waves to portray sediment deposition and thickness in harbours and inlets. A dating laboratory allows researchers to determine how quickly these sediments are accumulating. Dr Wang and her team of graduate students are now able to conduct studies on their own using the new equipment.

By about 1995, the modified harbours will be able to accommodate 20,000-tonne ships and service the

rapidly growing tourist industry in Hainan. Currently, large freighters must off-load their cargo onto smaller vessels, "not a very efficient situation," says Dr Schafer. "As I see it this area is developing and the kind of shipping flux you'll see there will depend on the area's development and not on the trade it is capturing from Hong Kong."

The results of Dr Wang and Dr Schafer's work will allow other regions to expand their harbour infrastructure more quickly in the current atmosphere of rapid economic development.



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NEW LIFE FOR PLASTIC SHEETS

In Jordan, market gardening is a growth industry. Although it did not even exist in 1967, greenhouses now cover some 100,000 hectares. As a result, Jordan's farmers are now able to grow vegetables in arid and semi-arid regions and meet the growing demand of the local market, as well as for export.

Jordan's chronic water shortage is the reason for the popularity of this method of cultivation, which is increasing by a healthy 3% every year. Hothouse cultivation produces higher yields than traditional farming methods and saves the maximum amount of water.

The only fly in the ointment is that the 4,500 metric tons of plastic membrane used each year to cover the hothouses deteriorates in under two years, primarily because of ultraviolet rays. All too often, it is burnt, left in the fields, or even eaten by cattle, often with fatal consequences.

Thanks to IDRC assistance, however, researchers at the Royal Scientific Society (RSS) in Amman and Montreal's McGill University, have developed a cost-effective procedure for recycling used plastic membranes. This was no small task: to produce in Jordan a multi-layered polyethylene membrane, incorporating the membranes that had deteriorated in the sun. The new product, moreover, had to have a longer life expectancy and cost less than the conventional membranes.

"The project met its objectives," is the modest claim of Nadia Khraishi, a research associate at the RSS Mechanical Design and Technology Centre in Amman. "With the help of the Canadians, we succeeded in producing a multi-layered membrane incorporating a high proportion of the used hothouse covers — at a cost lower than that of the single-layered membranes usually found on the Jordanian market. We are still studying the effects of accelerated aging on this new membrane, but the results so far are very encouraging!"

The first phase of the project was devoted to developing a process for recycling the discarded polyethylene

membranes, while the second phase enabled the team under Nadia Khraishi's leadership to produce the multi-layered membrane.

Recycled polyethylene makes up nearly 60% of the mixture. The outer layer is made from pure resin. The researchers thus produced a double-layered membrane of the same quality as that of other widely used membranes. Its cost is around 15% to 25% lower as a result of using recycled plastic, which is available locally in large amounts. This is a very important factor for a country like Jordan, which has to import most of the pure plastic it needs.

The Jordanian project is apparently the first to recycle used plastic on a large scale. The process developed by the Jordanian and Canadian researchers will probably be patented and will be transferred to local industry, which will use it to produce a less expensive, but high quality multi-layered membrane that is better suited to local needs. "As the problems created by the plastic waste are reduced and use of the membranes becomes more widespread, agricultural productivity will increase," reckons Dr. Musa Kamal, head of the Chemical Engineering Department at McGill University and joint leader of the project.

One thing is certain: in addition to helping some 40,000 farmers in Jordan, the process could also benefit other countries with semi-arid regions. The technology developed in Jordan has already been transferred to Egypt, where it was adapted to local conditions as part of another project funded by IDRC.



Recycling plastic sheets for greenhouses in Jordan solves a disposal problem and reduces the need for imported plastic.



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FROM VOLCANIC ASH COME HOUSES



Guatemala's Lake Atitlán lies in the country's volcano zone whose pozzolan deposits are a valuable source of housing material.

Throughout the world, volcanic activity is feared as an awesome, destructive force. To researchers in Latin America, Africa, and Canada, however, volcanoes provide volcanic ash, a basic material for low-cost housing.

Javier Quiñones at the Centro de Investigaciones de Ingeniería at the Universidad de San Carlos de Guatemala and Ugandan officials are teaming up with materials engineers at the University of Calgary and University of Toronto to build affordable housing using volcanic ash instead of Portland cement.

Portland cement, the most common building material, is expensive because of the large amount of energy involved in producing it. It must be fired at high temperatures and the transportation costs are high. The need for a viable alternative is immense, since much of the population in devel-

oping countries lives in inadequate housing. The prospect of reducing the cost hinges on reducing the price of building materials. Pozzolan cement made from volcanic ash is proving to be one answer.

Javier Quiñones' idea was to improve pozzolan cement with the hope of future large-scale production, following further research. He received funding for the project from IDRC, which put him in touch with Dr Robert Day at the University of Calgary.

Dr Day and the department of civil engineering are leaders in the development of pozzolan cement because of their work with "fly-ashes" (manufactured pozzolan). Alberta produces most of its electricity from coal-fired generating stations that produce fly ash as a by-product. Dr Day and his department have successfully promoted the use of fly ash in construction applications in Alberta.

The use of pozzolan in construction projects is not a new idea. Farmers in Latin America have used volcanic ash to build dwellings and fences for decades. Early American

MAKING BRICKS WITH RED MUD

studies in the use of pozzolan showed that cements made with pozzolan improved water resistance.

Pozzolan was used to build the San Francisco and Golden Gate Bridges. In all of these projects large quantities of pozzolan were discovered near the construction sites. Transportation and material costs were greatly reduced by using the local pozzolan deposits.

In the Guatemalan project, Quiñones proposed making blocks for one and two storey dwellings. In a mixture containing about one quarter lime, natural pozzolan behaves like Portland cement. The two ingredients can be mixed by hand, then placed in block forms and cured by solar heat. The blocks must remain moist for the chemical reaction to occur and thus create a strong bond.

Dr Day says houses built with these blocks will cost 50% less than ones using Portland cement blocks. About half of Guatemala's population, for example, lives in inadequate housing because of the high cost of building materials. The Guatemalans now plan to build four demonstration homes.

The project also encourages the use of alternative building techniques such as bamboo-reinforced walls and improved methods for securing the roof to the walls.

Another IDRC-funded project to exploit pozzolan is under way in Uganda. Dr Day is involved in similar projects in Bolivia, Chile and Ecuador.

"Small-scale production is occurring in all of these countries. A few towns know about the technology and are putting it to use," says Dr Day. He says the biggest obstacle is trying to publicize the technology on a large scale and to establish a quality-control standard for building codes.



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Jamaica, like many developing countries, has a shortage of affordable, safe housing. On the other hand, it has too much waste "red mud" from mining operations, creating a disposal headache.

But researchers from the Jamaica Bauxite Institute and the University of Toronto are hitting two birds with one stone by using the red mud to make bricks for inexpensive housing.

Jamaica's alumina industry produces 12 million tonnes of waste red mud annually. Bauxite containing alumina (the mineral compound from which aluminum is made) is mined in surface pit mines. The red mud is created when the bauxite undergoes the Bayer process, in which caustic soda is added to bauxite, producing alumina and residual minerals. This process creates huge amounts of waste red mud. It is pumped into abandoned bauxite mines or valleys that have been dammed at one end to make artificial ponds. The ponds fill quickly, producing an environmental and waste disposal problem.

The idea for using the red mud to make bricks came from Dr Arun Wagh of the University of the West Indies, Dr Carleton Davis of the Jamaican Bauxite Institute, and Dr J W Smith of the University of Toronto. With funding from IDRC, the team set out to develop a technology to turn the mud into safe, low-cost bricks with qualities similar to conventionally fired bricks.

The red mud is extremely alkaline owing to the caustic soda used in the Bayer process. Therefore, the researchers used its high pH level to their benefit. By adding sodium silica to the mud particles, a reaction between the alumina silica and sodium ions takes place, gluing the particles together. The bricks need only be dried in the sun, instead of being fired in ovens.

Not having to fire the bricks is an important consideration in Jamaica, says Dr Smith. "The advantage of using sodium silicate is that you are importing the equivalent amount of electrical energy into Jamaica, which is energy deficient, at a fraction of the cost and using sunshine to do the job."

The process for making this innovative product is extremely simple and inexpensive. The red mud is pressed into bricks using a standard brick press, immersed in sodium silicate, then dried in the sun. Although not as strong as fired bricks, they are substantially cheaper. A home built with the red mud bricks costs about half the price of one made from fired bricks.

Early in the project, the researchers were worried about the safety of red mud bricks. Jamaican soils

REPORTS



The red mud bricks need only be dried in the sun, rather than being fired in ovens, a significant energy savings.

are quite radioactive. But after conducting studies in a research lab in Toronto, it was discovered that the sodium silicate treatment reduces radon emissions by 30%. The bricks easily meet international standards for radiation.

A demonstration house has been built using the bricks at the Jamaican Bauxite Institute. Double coursing, two thicknesses of the bricks, and steel reinforcing are incorporated in the design to make the structure more durable during hurricanes and earth-

quakes. The roofs are also well secured to the walls.

Making red mud bricks may provide a partial answer to the alumina industry's waste disposal problem. The red mud brick industry could also help protect Jamaica's booming tourism industry by keeping the growth of the unsightly slurry ponds in check.

Dr Smith says the potential for a red mud brick industry is good. Someone will likely be interested in building a large-scale production facility for the bricks, he says.



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SMOKELESS PEAT FOR FUEL

As in many developing countries, the citizens of Burundi get nearly all their household energy from firewood. As a result, forests are disappearing at an increasing rate and the price of charcoal is rising steadily.

This East African country nonetheless has at least one billion metric tons of peat, which can be used as fuel. The people, however, shun this form of fuel because it gives off a thick, noxious, foul-smelling smoke.

Burundi's national peat marketing agency, l'Office national de la tourbe (ONATOUR) and the Société d'ingénierie Cartier Limitée of Montreal, tackled this problem together. Their research, jointly financed by IDRC and the Canadian International Development Agency, produced results: a new oven, designed by ONATOUR and Cartier, devolatilizes the peat through partial carbonization.

The quality of the product obtained by this method is the same as that of firewood. It is even cleaner as a fuel and is easy to handle, efficient and inexpensive. What is more, the process involved is simple and requires only local, often recycled materials. Before being heated, the peat is mixed with wood shavings or agricultural waste, such as rice husks or coffee hulls. The treated product is subsequently pressed into barbecue-type briquets for use in this form by households and small industries.

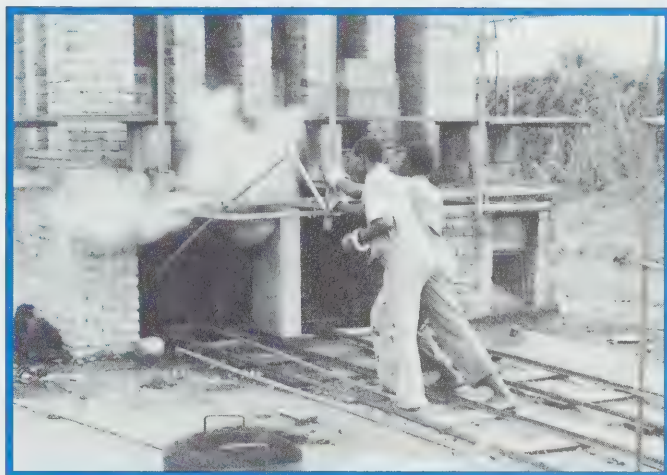
The briquets produced by the pilot facility have been marketed as "economical biomass charcoal" and have so far been accepted by restaurant owners and bakers. Sales have been so encouraging that Cartier and ONATOUR are studying the possibility of building a factory. An environmental impact study must, however, first be conducted to determine the effects of possible large-scale exploitation of peat on the water table and the health of users.

"It was an unorthodox project for an engineering company," explains Paul Courteau of the Société d'ingénierie Cartier. "When we began talking about it, people treated me as a heretic. It took seven years to convince the Board of Directors, but today, we're proud of it!"

The procedure jointly developed by engineers from Cartier and ONATOUR is simple — and, above all, efficient. It employs the same principles as those used in the partial carbonization of coal (lignite) — a process that was commonly used during the industrial revolution of the 19th century in Europe and America to produce "smokeless fuel," a coked and 100% devolatilized coal.

"The irony is that we can no longer find any technical data on it," adds Courteau, who has put his expertise to good use all over the developing world. "We made do with what we had and we succeeded. The project has even won two major environment awards."

ONATOUR and Cartier have built an experimental facility that can produce up to four metric tons of biomass charcoal every hour. The peat and biomass are put into a large, brick oven, three stories high, where it undergoes partial carbonization before being pressed into briquets. The cost



After drying in the sun, the peat is partially carbonized in an oven.

of this oven made with local materials is CA\$25,000. (An oven with greater capacity would be more expensive.)

If the project to build a factory to produce peat/biomass briquets ever becomes a reality, Burundi may be able to put an end to the worrying destruction of its vegetation. It would also create jobs in the production and distribution of the once unusable peat. Other developing countries also have major deposits of peat: Bangladesh, Rwanda, China, Senegal, Uganda and Zaire. They too could benefit from this rediscovered technology in the medium term.



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IN THE AGGREGATE

Although Rwanda has major stone deposits, its quarrying industry is not as dynamic as it might be, owing to a lack of local technical expertise. Rwanda accordingly imports at great cost virtually all the construction materials it needs, or uses concrete, which is expensive.

It is against this background that a cooperative project between the Université nationale du Rwanda at Butare and the University of Sherbrooke, Quebec came about through IDRC. The objective of the project, launched by Jean-Baptiste Katarwa, Dean of the Faculty of Applied Sciences, Université nationale du Rwanda, was to develop local raw materials to meet the country's growing needs in the civil engineering field.

"We developed at the University in Butare a laboratory similar to the one we have here at Sherbrooke," says Gérard Ballivy, Professor and researcher at the Faculty of Applied Sciences, University of Sherbrooke. "They now have the same expertise as us. From a practical point of view, we set up a rock mechanics laboratory and trained and developed a technician, Pasteur Biskere, who subsequently became the head of the laboratory.

"At the outset," explains Ballivy, "we met with the government ministries involved in developing the road network, and they gave us their cooperation. They allowed us to do some drilling in order to define the main features of the rock." As a result of the cooperation from government agencies, demonstration projects using stone materials have been set up.

Today, the same ministries send requests for research and analysis to the Butare Centre. At this rate, the laboratory should soon become self-supporting. Ballivy continues: "[The Centre] is going to generate activities that will benefit the local community and its training needs for future engineers. It will be able to use a variety of resources, while maintaining its objec-



Project leader Jean-Baptiste Katarwa.



Prof Gérard Ballivy of the University of Sherbrooke.

tive of achieving efficiency on an industrial level. We will thus be able to create local jobs by replacing imports with local materials, which should make them less dependent on foreign currency."

Researchers in Butare are now able to solve other problems, such as soil displacement, small-scale dams and the manufacture of paving stones to expand the road network.

In addition to its main objectives, the project will help establish excellent relations between the various organizations involved in developing the country. The skills of the engineers who came to Canada to complete their training have been upgraded. Ballivy believes that "the

creation of a course on rock mechanics is going to enhance the job opportunities for engineers trained at the Butare Centre and promote exchanges with neighbouring countries."

MUTUAL BENEFITS

For both universities, the spinoffs of this project are of sufficient importance to continue to expand relations further. "Both sides will be able to meet specific needs in the same discipline. [For us], the important thing is to go and find experience outside Canada so that we can understand the needs and specific features of these countries. This will increase our area of expertise in rock and local conditions which are very different to ours, especially the climate, resources and topography. This will help make students and faculty aware of the issues facing developing countries." Gérard Ballivy concludes with the comment that "this is important for Canadian engineers, because fifty per cent of job opportunities in the future will be abroad."



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ACTIVATED CARBON FROM MINE LEFTOVERS

Scientists in Medellin, Colombia, collaborating with Canadian researchers, have created a promising new activated carbon industry out of a chronic waste disposal problem.

Activated carbon is a highly porous substance prized as a filtration agent. The material has dozens of uses. It can clarify wine and purify water. It is a staple of the food processing, beverage and pharmaceutical industries. And it is even used in protective gear such as gas masks.

Traditionally, Colombia has imported most of the activated carbon it consumes, an estimated 2000 tonnes each year. But the country also produces coal. Sensing an opportunity, Professor Jaime Aguirre, of the National University of Colombia (NUC), approached IDRC with a plan to convert the mining industry's leftovers, called coal fines, into charcoal.

"It sounded like a good idea," says Stuart Barton, a scientist at Royal Military College in Kingston, Ontario, who reviewed the proposal for IDRC. Coal fines are sandy particles too small to burn and a nuisance to dispose of. More importantly, they are a suitable starting material for making carbon.

"You can make activated charcoal from all sorts of things, including peach pits and coconut shells. What's required is a material of natural origin that has an inherent pore structure," he says.

With input from Professor Henry Becker, a chemical engineer at Queen's University in Kingston, Dr Barton and Dr Aguirre designed a "fluidized bed" system for generating activated charcoal continuously. The process, which has been patented in Colombia, involves first charring the coal fines to expose their pores, and then steaming the

pores open. During both stages of this process, the fines are suspended on a stream of very hot gases.

Success is measured by the porosity of the final product, says Dr Barton. "If you've done a good job, the surface area will have increased from under 100 square metres per gram to 1000 square metres per gram."

Using a pilot-scale reactor, Dr Aguirre and his colleagues have long since mastered the fluidized bed technique and are now in the process of building a commercial-scale plant. In a related development, the city of Medellin is proposing the construction of a water purification plant based on charcoal filtration.

As a result of his work in Colombia, Dr Barton expresses more optimism about the country's future, particularly with new industries, such as activated carbon, laying roots.



Canadian researchers Henry Becker (left) and Stuart Barton (2nd from right) with Colombian colleagues Alonzo Ocampo (2nd from left) and Jaime Aguirre (right).



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WOOD GLUES WITH STAYING POWER

When it is time for building or renovating, Canadians take some things for granted. They trust their local lumber yard to stock the construction materials they need and count on those materials to last beyond the life of their mortgage.

But in Tanzania, it is a different story. Demand for plywood and related wood products is about double what local sawmills can supply. Worse, what little they do produce is often substandard.

To remedy the situation, scientists from the Tanzania Industrial Research and Development Organization (TIRDO) have been collaborating with Forintek Canada, an Ottawa research institute, in a project funded by IDRC. Led by TIRDO chemist Bonaventura Mwingira, the project team has successfully developed safe, new, water-resistant wood adhesives based on inexpensive materials available locally. The ultimate goal, now well within reach, is to help Tanzanian sawmills export their products to other African countries.

Making a sturdy piece of plywood requires a strong adhesive, explains Jack Shields, director of composite wood products at Forintek. Lacking a domestic supplier of adhesives, Tanzanian mills must purchase them abroad. But foreign exchange is scarce in the country, so they cannot afford the best glues. Nor can they afford enough of the alternative, urea formaldehyde, to meet everyone's needs. In any case, urea formaldehyde has certain disadvantages.

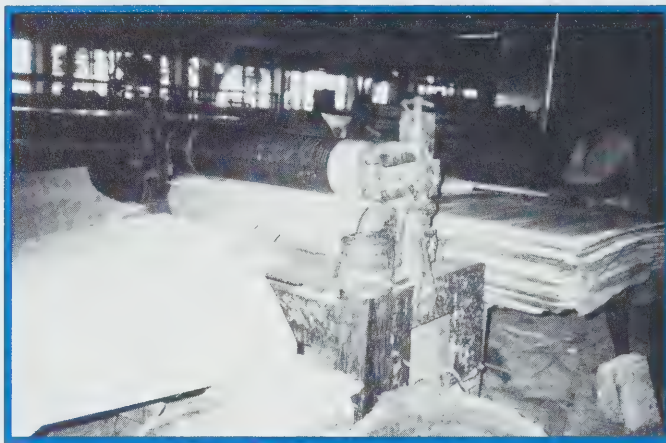
"The problem with urea formaldehyde resins is they tend to swell and lose their strength in humid conditions," says Mr Shields. "Tanzania has a very humid climate. So when you make a particle board for use in a ceiling, and the roof develops a leak, everything starts to disintegrate."

LOCAL RAW MATERIALS

The IDRC project began in 1991 with a chemical evaluation of the adhesive potential of various materials. Tanzanian researchers focused on cashew nut shell liquid, a byproduct of the cashew industry, and wattle tannin, an extract from the bark of mimosa trees, which is already produced in Tanzania. From that point, the research shifted to Forintek for more detailed studies. A crew from Canada and Tanzania tested dozens of different formulations over a 15-month period.

"It was kitchen style chemistry," says Mr Shields. Through a process of trial and error, the team ended up with two tannin-based adhesives, one for plywood and one for particle boards, that satisfied rigorous Canadian standards. In one test, for example, plywood samples that had been soaked in water and then boiled still maintained their integrity.

The plywood adhesive has since passed the acid test, acceptance by mill workers. In field trials during 1992, the new recipe was approved by a firm in Tanga, north of Dar es Salaam. According to Bonaventura Mwingira, mills primarily want simplicity. "You can't make a batch of adhesives in advance because the life span of the chemicals is



Tannin-based adhesives, used to make plywood and particle board, are helping improve the local supply of good quality building materials.

only about four hours." As for the other adhesive, trials began in January 1993 at a Tanzanian particle board plant.

Although this project is winding down, related research lies ahead. "At TIRDO, they're already discussing phase two," says Mr Shields. "They're interested in incorporating natural insecticides into wood panels to deter termites." And thanks to a used equipment donation from Forintek, he adds, this time they will be able to do the research at home.



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FIRED UP ABOUT BRICKS

In Rwanda, there is increasing demand for good, affordable housing. Although Rwandans have always built permanent structures out of brick, the cottage-industry method of brickmaking is inefficient and wasteful of fuel and materials.

Fortunately, researchers at the Université nationale du Rwanda have developed a new technique for manufacturing bricks with the help of colleagues from the University of Sherbrooke in Quebec.

They decided to adapt a simple technique widely used in Quebec in the past. The new, standard-size bricks are of better quality and more durable than the old Rwandan cottage product. The new procedure may well even bring down the cost of bricks. In addition, the new ovens should meet the country's yearly demand, now over 70 million bricks, sooner.

The Rwandan team is headed by Jean-Baptiste Katarwa, Dean of the Faculty of Applied Sciences at the Université nationale du Rwanda. Pierre-Claude Aïtcin, a material science specialist from the University of

Sherbrooke, coordinates the Canadian team. "We sent two extremely competent people [to Rwanda], who get on very well with the Rwandan team. That enabled us to finish the project well ahead of schedule," says Pierre-Claude Aïtcin.

"We also had considerable support," in Rwanda, provided by the Marist Brothers, a religious community that runs a training school for local people: "Our students are mainly young people aged 18 or 19, who would be considered dropouts [in Canada]."

The role of the scientists from the University of Sherbrooke consisted of demonstrating how to construct the ovens and improving the brick-making process. Four ovens, called igloos, were built using a simple technique that could be easily acquired by local artisans. These ovens maintain an even temperature of about 1,000°C, compared to the fluctuating temperature of the open wood fires previously used by the craftspeople of the marshes.

The properties of the clay were also altered by adding rice husks. "This gives several technological advantages over traditional bricks," Aïtcin points out. The bricks do not shrink as much, crack less and are lighter. "We

have also made insulation bricks that take up the first row inside the oven. By adding a lot of sawdust to the clay, a highly porous brick is produced that retains heat better, thereby reducing the oven's heat loss accordingly."

SPINOFFS FOR THE ENVIRONMENT

In addition to the qualities of the new brick, the oven's technology and the clay's new composition will enable a considerable amount of material formerly regarded as waste to be salvaged. A large quantity of eucalyptus wood used as fuel can apparently also be saved: plans even exist to fuel the ovens with waste car oil.

In conclusion, Aïtcin points out that "the Rwandan group managing the ovens currently has orders for over 800,000 bricks: this is enough to build approximately 20 houses. Our responsibility was limited to showing them how to construct the ovens; it is now up to the local people to build more ovens with the knowledge and training they have acquired." The idea has already caught the attention of two entrepreneurs who are interested in the technology for its commercial potential and who intend to market the improved brick.



The dome of the igloo-style oven is closed up, brick by brick. It can produce an even temperature of about 1000 °C.



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A NATURAL PATH TO PESTICIDES

Long before synthetic pesticides were invented, farmers around the world had their own home remedies against harmful insects. Typically, they would crush the leaves of a poisonous plant, dissolve them in water, then spray the solution on their crops.

The old ways fell into disuse with the advent of synthetic pesticides. One or two applications of pesticides enabled farmers to rid their fields of insect predators throughout the growing season. This approach seemed convenient, effective and economical.

But scientists now realize that synthetic pesticides have many hidden costs. According to World Health Organization estimates, up to 20,000 people die of pesticide poisoning in the Third World each year. And some synthetic pesticides are accumulating in soil and groundwater where they threaten the health of entire ecosystems.

To make matters worse, synthetic pesticides are rapidly losing their effectiveness. To date, hundreds of insect species have developed resistance to at least one pesticide formula and a dozen or so species are immune to them all. Some scientists fear that pesticide manufacturers will eventually be unable to outwit insects.

Enter Pichaet Wiriyaichitra, a pharmacologist at Chiang Mai University, Thailand and Bernard Philogène, a botanist at the University of Ottawa. With funding from IDRC, they are coordinating a search for natural alternatives to synthetic pesticides. Since 1989, they and their colleagues have investigated dozens of plants used traditionally by Thai farmers to repel insect herbivores.

In Thailand, botanical pesticides are becoming increasingly attractive since the natural substances tend to be safer and more environmentally friendly than synthetic products, says Dr Philogène. Moreover, by developing a botanical pesticide industry, Thailand could reduce its imports of synthetic pesticides, valued in 1988 at around \$70 million.

Botanical pesticides also offer various means of combating insects resistant to products currently available. Almost all synthetic pesticides rely on neurotoxic agents, meaning they attack the nervous system of insects. But tropical plants have over time developed literally thousands of weapons that kill insects in other ways. For example, the makabuhay vine, which grows in the Philippines, burns insects using a chemical that absorbs sunlight.

The IDRC-supported team has isolated two natural products that appear to have commercial potential. One substance, dubbed 'Insect Kill,' destroys the eggs of feeding insects. The other, called 'Stop Feed,' suppresses their appetite. "We have given them code names because if we revealed which plants they come from, we might not be able to obtain patents," explains Dr Philogène.

The next step is to conduct toxicological studies to satisfy pesticide registration requirements. "You have to demonstrate that the compound is not only effective against insects but is also non-toxic to non-target organisms, such



Dr Belem Rejesus of the University of the Philippines at Los Baños examines the vine called "makabuhay," or elixir of life.

as birds, fish and mammals," says Dr Philogène. This work, which is being divided between labs in Canada, the United States and Thailand, could take several years to complete.

Assuming the research stays on track, Dr Philogène says he believes this project will ultimately benefit not only Thailand but most agricultural nations. From Canada's perspective, once a new product has been patented, "we can test it with the aim of using it on our own fields."



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FISHING IN THE RICE PADDY



As well as being accessible to poorer farmers, rice-fish farming has ecological benefits and produces a source of protein.

The traditional Asian practice of raising fish in rice paddies is making a comeback in the lush rice fields of West Java, Indonesia and Thailand.

The technique of rice-fish farming is the simultaneous production of fish and rice in the same flooded fields. The 2000-year old system was abandoned by many countries because of the "green revolution"'s prescriptions of high-yielding, monoculture rice varieties that required the use of pesticides and fertilizers, and double- and triple- cropping of rice. Although productive, these practices reduce soil fertility and are expensive for farmers to maintain.

The rice-fish project, supported by IDRC, is the work of Dr Achmad Fagi, a food crop scientist in West Java,

Indonesia and Niran Tongpan of the Farming Systems Research Institute in Bangkok, Thailand, who collaborate with Canadian researchers. The project fits well with IDRC's goal of sustainable development. The researchers are "basically showing that this is an efficient, low-input system," says IDRC's director of aquatic resources, Brian Davy.

PROTEIN SOURCE

According to Greg Chapman, a Canadian who worked on the project in Thailand, "fish take useless things and turn them into protein." Chapman is now working on aquaculture projects in Laos. He notes that fish eat algae, rice pollen, weeds and insects while also fertilizing the soil more effectively than commercial products. Fish also reduce pests by eating leafhoppers, stem borers, and aphids and lower the incidence of several rice

diseases. Rice-fish farming also creates a reliable source of protein for the farmers, offsetting the decreased availability of wild fish in many countries.

In the West Java Project, the introduction of ducks has enhanced the rice-fish ecosystem. They eat crabs and insects and their droppings act as a nutritive addition.

Rice-fish culture can actually increase the yields of rice (up to 25 to 30%) while providing farmers with extra income. According to Davy, this is important in areas such as north-eastern Thailand, where the farmers are marginalized, cultivate under difficult conditions and find the cost of pesticides and fertilizers financially burdensome.

"The program is aimed at the poor farmer, since it requires a minimal capital outlay," says Rolf Schoenert, a

MAKING CANOLA EVEN BETTER

senior environmental fisheries and aquatic specialist at Agrodev Canada Incorporated, an Ottawa-based company involved in the project.

FISH REFUGE

To begin a rice-fish operation, the farmer digs a small pond or trench up to a metre deep in a low-lying area of the rice field, to act as a "refuge" for the fish. The excavated soil is used to raise the banks of the field to ensure good water control.

When the field is flooded by irrigation water (or by the rains, as in north-east Thailand), rice is planted as usual. Soon after, however, fish fingerlings are introduced. The most frequently cultivated fish in Indonesia are carp, tilapia and catfish.

After about three weeks, during which time the rice plants become established, the fish are let out of the refuge and allowed to forage in the paddy. At harvest time, the water is drained and the fish are collected from the refuge.

The main cost is buying fish fingerlings. The supply of fish is also a problem since some areas do not have well developed hatcheries, says Davy.

In Indonesia, rice-fish culture is being practiced in more than 70,000 hectares of rice fields. The potential for further reviving the valuable practice is huge. In Indonesia alone, there are another 4.2 million hectares of rice fields that could benefit from the rice-fish culture method.

Canola, a type of rapeseed bred in China, Egypt and Canada, produces what is considered the purest of oils used to prepare foods for human consumption.

Now, agricultural researchers in these three countries are teaming up to improve canola's resistance to pests and disease, with support from IDRC. The Chinese and Canadian scientists are working to improve crop quality, while in another project, Egyptian and Canadian researchers are developing a biological pest control agent.

The two projects are intended mainly to boost canola production in China and Egypt, but they have also brought benefits to Canadian canola production. China and Canada are

already the two largest producers of canola in the world.

The first project is led by Dr Liu Chen Qing of the Crop Research Institute in Wuhan and Dr Fang Guang Hua of the Shanghai Academy of Agricultural Sciences. Plant pathologist Dr Roger Rimmer of the University of Manitoba worked with his Chinese colleagues, sharing techniques, ideas, and germplasm. The collaboration resulted in higher quality canola in China and plants resistant to diseases common in western Canada.

ESSENTIAL CROP

Existing Chinese varieties of rapeseed are high in two substances: erucic acid — which causes abnormal heart development in rats and is considered harmful to humans — and glucosinolates found in the rapeseed



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Cultivating rapeseed in China. Chinese rapeseed germplasm will help increase Canadian rapeseed's resistance to diseases such as stem rot.

cake once the oil has been extracted. Glucosinolates are harmful to animals. Since rapeseed is China's second most important oilseed crop and is also a livestock feed, improving its quality is essential to feeding both humans and livestock.

Canadian breeders developed rapeseed varieties that are "double low." This designation means they are low in erucic acid and in glucosinolates. "The Chinese have received a lot of expertise on how to breed for quality. We've supplied them with equipment and the technical knowledge to handle it so they can use the equipment for routine selection for low erucic acid and low glucosinolates," says Dr Rimmer. In return Dr Rimmer received Chinese rapeseed germplasm. It will help increase Canadian rapeseed's resistance to diseases such as *Sclerotinia* stem rot caused by a fungal pathogen. Chinese varieties are also known for their high resistance to root diseases.

The second project finds Dr H.S. Salama of Egypt's National Research Centre teamed with insect pathologist Dr O.N. Morris of Agriculture Canada. Their primary goal is to reduce the use of chemical pesticides that can leave toxic residues in edible plants, thereby compromising the health of consumers and agricultural workers. The researchers developed new strains of *Bacillus thuringiensis* (B.t.) as a biological control agent against insects that destroy canola in Canada and cash crops in Egypt.

NATURAL PESTICIDE

B.t. is a disease-producing bacterium found readily in nature that only affects insects. It is not toxic to people or other animals and is environmentally safe. Sprays are prepared from

the bacterium itself. The forestry sector in Canada currently sprays a commercial B.t. product to battle spruce budworm. The city of Winnipeg uses a B.t. product to control mosquitos that can carry encephalitis, which causes inflammation of the brain. Both of these products are produced in the United States. B.t. has not been used on agricultural crops in Canada because the available commercial strain is not as effective nor as economically competitive as chemical pesticides.

The Canadian and Egyptian team, with funding from IDRC, has developed new, more effective strains of B.t. The new strains can be produced in large quantities at lower cost than the commercial strains. In Canada the different strains are being tested against the Bertha armyworm, a major canola pest. In Egypt the new strains have been tested against pests that attack soybeans and groundnuts, two important cash crops.

The new B.t. strains had to be developed specifically for each country's climate, environment and insect species. "The Egyptians developed their own strain, tested it and found it to be effective. The big problem is to be able to produce it on a large scale," says Dr Morris. A feasibility study shows that Egypt would be able to produce its strains of B.t. on a commercial scale.

There is no doubt that China and Egypt have both benefited from this research. But Canadian researchers have greatly enhanced their own knowledge in the process. "The quality of canola oil [in Canada] is now second to none," says Dr Rimmer.



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RESCUING ERODED LANDS

Western Kenya's Lake Baringo District used to be well covered with grasses and trees, a home to pastoral, semi-nomadic peoples. Today, expanding human and livestock populations, insecure land tenure and more roads and settlements are reducing dramatically the amount of vegetation in the region and the carrying capacity of the land.

Soil erosion is among the most pressing problems afflicting this semi-arid and arid region. It accounts for substantial loss of crop and pastoral lands as well as reduced fishing productivity in Lake Baringo. The Baringo District exhibits some of the most severely eroded areas in the country. Long, deep gullies scar the fields.

But a collaborative project between Kenyan and Canadian researchers is trying to create an indigenous group of highly trained specialists in the problems of soil erosion in semi-arid regions. The collaborative project, funded by IDRC, is administered by Dr Wilson Kipkore of Moi University and Dr R. B. Bryan of the University of Toronto. The main goal is to allow some of the best graduate students to take advantage of teaching resources at the University of Toronto.

"We have a number of students who do their course work at Toronto and their fieldwork in Kenya," says Dr Bryan. "It gives them practical experience in the latest technologies and the realities of conducting research and problem solving in developing countries."

"We have foresters working with soil conservationists and soil conservationists working with water management people," says Dr Bryan. This informal network serves as an

information source for the young specialists. "I think this is perhaps the most successful feature of the project."

The project site in Baringo contains striking examples of the major soil erosion problems and related social conditions found in African semi-arid regions, all within just a 30 km radius of the lake. The valley floor receives 650 mm of rain a year while 1200 mm fall on the surrounding mountains. "You go from dry land problems to steep wet mountain slopes in a fairly short distance," says Dr Bryan.

Dr Bryan says the district's relatively numerous trees distract attention from the lack of ground vegetation, essential in preventing soil erosion. It has been depleted mainly from overgrazing by the livestock of the growing human population. After some 70 years of degradation, extensive areas are now devoid of vegetation or are covered with unpalatable or toxic plants. Grasses have been virtually eliminated and seed sources are extremely restricted.

"Over the area most of the soils are bare of vegetation for much of the year, particularly at the critical period of the year which is the end of the dry season and beginning of the wet season in April. When the wet season comes the heaviest rains hit the exposed soil, resulting in serious soil erosion," says Dr Bryan.

The research team has identified a number of techniques for re-establishing grasses, increasing infiltration, and harvesting runoff water. The most efficient methods include surface mulching with stones and organic matter, which reduce evaporation. The researchers have also planted indigenous trees and shrubs to stabilize the soil. *Acacia tortilis*, a nitrogen-fixing tree, is proving to be highly successful.

The knowledge gained from this project has immediate implications for other semi-arid regions that suffer from high rates of soil erosion. In addition, the creation of an indigenous core of specialists and a network to share information demonstrates the potential for capacity building.



L-shaped earth mounds act as low-cost microcatchments to control storm runoff. Other semi-arid regions could benefit from the Lake Baringo research on restoring degraded lands.



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HELPING MOTHER NATURE SPAWN

A fish spawning kit developed by Chinese and Canadian researchers is putting smiles on the faces of hatchery owners in southern China, Alberta, and British Columbia.

The kit is based on research by Prof Lin Haoren of Zhongshan University of Guangzhou, China and Dr Richard Peter of the University of Alberta. It combines drugs and synthetic hormones to overcome the reluctance of fish to breed in captivity.

With funding from IDRC in 1984, Dr Peter and Prof Lin initiated a cooperative project to test the method on Chinese carp. The project became a good example of capacity building, according to Dr Peter. "As the project continued, I started setting, with Prof Lin, more general objectives. When I was in China, we were developing their research expertise at [Prof Lin's] labs and directing the studies of his graduate students."

Fish farmers raise their stock at high densities in the artificial confines of fish ponds and paddies. The fish do not encounter the environmental cues needed to reproduce naturally. With 3000 years of aquaculture, Chinese fish farmers are familiar with the problem. Since 1958, the Chinese have induced spawning by injecting mature fish with either the hormone HCG (human chorionic gonadotropin) — found in the urine of pregnant women — or pituitary extracts from the brood stock. Although effective, this method is extremely costly. A single Chinese hatchery kills as many as 80,000 carp (the main fish raised in Guangzhou) annually to provide extracts to induce spawning.

Dr Peter and other Canadian researchers found that a hormone produced in the brain, luteinizing hormone-releasing hormone (LHRH), makes the pituitary gland produce gonadotropin, which stimulates the spawning process. However, LHRH alone was not enough to induce spawning.

Dr Peter says research on another brain chemical, dopamine, found it to be inhibiting the release of gonadotropin. Dr Peter set out to pinpoint which drug would act as the best "dopamine antagonist". It was found that injections of LHRH accompanied with the dopamine antagonist (pimozide) resulted in high rates of ovulation. Dr Peter conducted his research on goldfish, a close relative of Chinese carp.

In 1984, Dr Peter and Prof Lin began testing the method on Chinese carp, to great success. "The last time I was in China in 1990, one hatchery had doubled its production to about 1.2 billion fry per year," says Dr Peter. "Everyone was smiling and making lots of money because they were more cost efficient and cost effective."

Traditional techniques to induce spawning require handling each fish twice. Dr Peter's method requires one injection that administers all the drugs at once. Handling, damage to the fish, and the spread of disease are all reduced. The new method also allows hatcheries to better predict when spawning will occur and hatcheries no longer have to kill their brood stock for extracts.



The Chinese have 3,000 years of experience in fish farming.

The kit's success spread quickly. It is now being used in Bangladesh, India, Indonesia, Malaysia, Pakistan, Taiwan, and in salmon fisheries in British Columbia. The Allison Creek Fish Hatchery in Alberta is using it to synchronize the spawning of their trout stock.

Syndel Laboratories in Vancouver have commercialized the kit under the name Ovaprim. It can be used on bream, carp, salmon, trout, catfish, loach and other species.



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THE RIGHT DATA ON HUMAN RIGHTS

Hundreds, if not thousands, of people died at the hands of the military government in Argentina during the 1970s. Many people deemed enemies of the state disappeared, only to be found later in mass graves with torture scars and bullet wounds.

Argentina was among the many nations where social, economic and political instability created a climate for covert arrests, torture and executions. Information about the victims of these crimes is collected by governmental and nongovernmental organizations around the world. To be effective, this information should be recorded following agreed-upon standards that permit faster and better exchange among organizations doing complementary work.

The case of Argentina illustrates perfectly the need for standard formats to record human rights violations. When civilian authorities began investigating disappearances, they were confronted with data collected by five different agencies, all using different data elements, making comparisons and cross-checking almost impossible.

A remedy may be found in a project supported by IDRC and the Government of the Netherlands and coordinated by Winnipeg teacher and librarian Judith Dueck. Ms Dueck, who gained her human rights experience working with Al-Haq, the West Bank affiliate of the International Commission of Jurists, leads an international task force organized by Human Rights Information and Documentation Systems (HURIDOCS) International, based in Oslo, Norway.

The task force, made up of members from the North and South, has developed a system for organizing, recording and reporting large quantities of information on the victims of human rights abuses, using standard, well-defined data elements. Ricardo Cifuentes, a computer specialist in Chile, and member of the task force, designed the corresponding database structure using DBASE 3 software.



Standard recording formats will allow humanitarian groups to do their work more effectively.

Further work on facilitating data exchange among different systems is being done by another HURIDOCS task force headed by Jo Jo Tam of Hong Kong.

The system, entitled "Standard Formats: A Tool In the Documentation of Human Rights Violations," will allow large and small organizations involved in human rights and humanitarian concerns to coordinate their efforts and develop databases that could be accessible worldwide. "We basically worked on this by taking the forms used by many human rights organizations and tried to find a consensus," says Ms Dueck.

The new tool allows organizations to record data on human rights violations in five basic categories: the event itself; the victim; sources of information; information on the perpetrator; and intervention information. These five categories are further divided into more detailed subcategories.

"Each organization has its own needs," says Ms Dueck. The task force's document is flexible enough to adapt to these needs. "We've been finding that some organizations are interested in certain categories and not others. Organizations can eliminate the categories they don't need."

The real benefit of standardization is that once a good number of groups adopt the process, data can be exchangeable, she explains. This collaboration would permit the efficient use of information worldwide on human rights violations and social justice cases.

The format is already being used on a limited basis. Amnesty International, SOS Torture, the International Confederation of Free Trade Unions, and grassroots organizations in Latin America, the Philippines and elsewhere are all testing the formats. With HURIDOCS International's extensive training program, "we are hoping that over the next ten years it will become the standard," says Ms Dueck.



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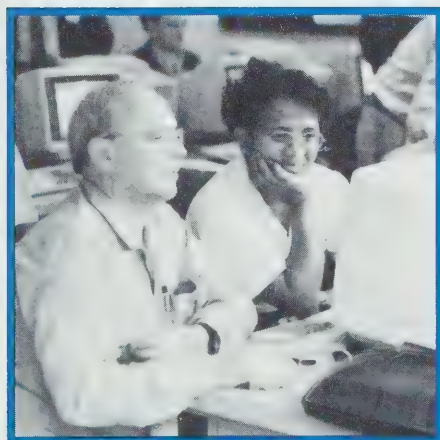
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ALL POISONS ARE NOT ALIKE

Many cases of poisoning are caused by the misuse of pesticides, medication, chemicals or, quite simply, contact with a natural poison. Every year, tens of thousands of people in the world die from it or suffer its after-effects.

This situation is particularly tragic in developing countries, where poison control centres are only a dream for a handful of isolated toxicologists. To find solutions to this major problem, IDRC supported a group of Canadian researchers, headed by P.K. Abeytungu, Director of Information Sciences at the Canadian Centre for Occupational Health and Safety, and Albert Nantel, toxicologist and Director of the Centre de toxicologie du Québec.

Cooperation between toxicologists extends today to South America, the Caribbean and many countries in Asia, the Middle East and Africa. This cooperation has resulted in the creation of *Intox*, a software program that manages a data bank on toxic products and can be used on a simple PC equipped with a compact disc reader (CD-ROM).



Dr Albert Nantel (left) instructs a student at a training workshop held at INTOX in Belgium.

The user can quickly locate a wealth of information on a specific toxic product: this information is recorded on videodisc and is like a small toxicology library. Users can find information on the composition of products, antidotes and treatments, the number of known cases of poisonings, etc. *Intox* also gives users the option of transferring the information onto their computer's hard disk, thereby allowing them to tailor the data to their own requirements and update it quickly. Adaptability is vital, because doctors must know the precise product to determine the antidote and appropriate treatment.

Intox is, however, only one aspect of a huge project of international cooperation in toxicology. "We first established a forum so that toxicologists from participating countries could exchange views on their respective problems," says Albert Nantel, one of the few toxicologists in Quebec who are also physicians. The isolation had to end because "the number of toxicologists in many countries, even developed ones, can be counted on the fingers of one hand." The forum's main achievement was to successfully establish priorities that take account of the situation in developing, rather than developed, countries. "This is one of the main lessons I learned from this experience," stressed Dr. Nantel, who was participating in his first international cooperation project.

The project has made it possible to define more accurately the role of toxicology in the much wider context of public health. "As a result of our experience in developed countries," explains Albert Nantel, "we can state categorically that it is more cost-effective to practise prevention than to intervene in an emergency." For the founder of the Centre de toxicologie du Québec, poison control centres are also genuine pressure groups that should make governments and the general public aware of the problems created by toxic products. "This is why we encourage people to create agencies that include chemists, agronomists and environmentalists and will be able, for example, to ban the use of a specific product."

For the toxicologist-cum-physician, cooperating with colleagues from developing countries gave him the opportunity to take stock of his own career. "We all recognized the importance of creating solid structures whose futures do not depend on one or two people." A piece of advice that he is putting into practice at the Centre de toxicologie du Québec.



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STAYING ON TOP OF HEALTH NEWS

In Africa, keeping up to date with the latest medical news is difficult. The cost of journals and other sources of medical information is often too high for institutions that are strapped for funds.

But now, an innovative project called HealthNet allows health workers to access information and communicate with colleagues in the North and in the South.

All that is needed to access HealthNet is a personal computer, a modem-like device, a standard VHF radio transceiver, appropriate authorization, and an inexpensive antenna that forms a ground station for a low-earth orbit (LEO) satellite. The HealthNet satellite receives, stores, and forwards information from ground stations in Africa and other regions of the world.

In many African countries mail, telex, and fax services are underdeveloped, expensive and still unreliable. The HealthNet technology provides an alternative medium for exchange and transfer of information.

The HealthNet project, supported by IDRC among others, was initiated by SatelLife, an international, non-profit organization based in Cambridge, Massachusetts that serves health and communication needs in developing nations. The LEO satellite (also known as a microsat) was built by Surrey Satellite Technology at the University of Surrey in the UK.

REACHING ISOLATED AREAS

Dr A. M. House of Memorial University's Faculty of Medicine in St. John's, Newfoundland is also collaborating in the project. Dr House, a specialist in telemedicine, and his colleagues owe their involvement to their expertise in getting vital information to remote communities. Much of Dr House's work centres on improving health and education communication for isolated communities in Newfoundland and Labrador.

As a result of Dr House's expertise and Memorial's previous international work, the University agreed to function as the North American "gateway" for the HealthNet project. All the messages to be sent from North America are sent to Memorial via electronic mail for transfer to the satellite.

The system works by using the VHF radio band frequency. The satellite emits a continuous signal that is picked up by the radio transceiver attached to the personal



HealthNet's low-earth orbit satellite will facilitate sending information to health workers in the South.

computer. Once the signal is recognized, a message transfer takes place between the satellite and the ground station.

The equivalent of the contents of a medical journal could, with compression techniques, be transmitted in one pass of the satellite over a ground station, says Dr House.

LEO satellites are considered low tech and inexpensive in the world of satellite technology since they cost only about C\$1.5 million. Their higher flying, geostationary cousins cost as much as \$300 million. It is the relatively low cost of LEO technology that makes the HealthNet project viable.

As part of the project, Canadian medical and health science libraries are invited to become an information base from which African institutions can draw. The New England Journal of Medicine is also participating by allowing the use of its material free of charge.

In Africa, ground stations have been established in Congo, Ghana, Kenya, Mozambique, Tanzania, Uganda, and Zambia. There is also a station in Brazil and plans are under way to put stations in Cuba, the Philippines and Thailand during 1993.



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AN AIDS TEST THAT TRAVELS WELL

Few advances have made as large an impact in controlling the spread of AIDS as diagnostic blood tests for the human immunodeficiency virus (HIV). In the developed world, HIV testing has virtually eliminated the risk of viral infection through blood transfusion and has helped health authorities monitor the spread of AIDS.

However, for many developing countries, HIV testing can be an unaffordable luxury. Currently available HIV tests are designed for use by highly trained technicians working in modern clinical laboratories. The tests simply do not travel well to communities where the electricity may be turned off for several hours a day.

But this unsatisfactory situation is about to change. In a project funded by IDRC and the Rockefeller Foundation, researchers at the Program for Appropriate Technology in Health (PATH), a non-governmental organization based in Seattle, Washington, have developed the first screening test ever designed with the realities of developing countries in mind. The test detects antibodies to HIV-1 and HIV-2 AIDS viruses. It gives an answer in 20 minutes, costs just 25 cents per sample, and travels remarkably well.

KEEPING THINGS SIMPLE

"We insisted from the start that the technology be kept simple," says Dr Don de Savigny, the IDRC project coordinator. "We wanted a test that would work as well as the best commercially available tests but be more appropriate for resource-poor settings." This meant the test had to work without electricity, instrumentation or cold-chain, be easy to learn and sustain, and be manufacturable in developing countries.

The test kit features a plastic dipstick shaped like a comb with eight test strips or teeth. The test is performed by dipping the teeth in blood samples for 10 minutes, rinsing them, followed by a soaking in a reagent solution. If a



The dipstick test can screen blood for HIV without requiring electricity, instrumentation or refrigeration.

red dot appears on a tooth, then the corresponding sample is almost certainly contaminated.

Evaluations conducted by the World Health Organization and Health and Welfare Canada indicate the dipstick is as reliable as screening tests already on the market. Field trials in Uganda, Kenya, Brazil, China, Indonesia, India and Thailand indicate high sensitivity and false positive readings less than 2% of the time, which is comparable to screening tests used in Canada. So far, Kenya, Uganda, Cameroon, China and Thailand have expressed interest in manufacturing the test; India and Indonesia are already manufacturing it.

According to Dr de Savigny, children and mothers stand to gain the most from this technology. "Blood transfusions are very common in the developing world, especially in Africa where there is a high incidence of malaria," he says. "Hospitals there see a lot of children with life-threatening anemia who, if they don't get a transfusion within 24 hours, will die. In those

situations, if you don't have the ability to screen blood, you transfuse anyway and hope for the best."

Besides reducing the spread of HIV, the dipstick may also open some doors in AIDS research. Logistical barriers have so far prevented scientists from monitoring the incidence of HIV in developing countries. But the low cost of the dipstick means it may be possible to conduct surveys involving thousands of people to find out how far HIV has spread.

The dipstick test has already been used to conduct the first seroprevalence survey for HIV in Haiti. IDRC supported Dr Michel Cayemittes of the Institut Haïtien de l'Enfance and Dr Catherine Hankins of the Montreal General Hospital to do the research. They used blood samples from simple finger pricks collected on filter paper, a technique pioneered in Canada. The samples came from a randomly selected group of pregnant women from across Haiti. Test results were

CLEANING UP ON SCHISTOSOMIASIS

unlinked from identifiable individuals so that donors remained anonymous.

The Haitian-Canadian team tested its blood samples both conventionally at the laboratory of the Federal Centre for AIDS in Ottawa and using the dipstick technology in Haiti. The results again proved that the dipstick test is reliable and, moreover, it can be used with just a spot of dried blood.

"The cost of collecting blood samples is also a consideration," says Dr de Savigny. "But we've shown that you can use the dipstick on dried blood. All it would take to collect enough blood for testing purposes is a finger prick."

Disease-carrying snails and other troublesome molluscs throughout the world may soon meet their match in the form of a natural pesticide derived from the purple berries of an African plant.

In research spanning nearly three decades, scientists in Ethiopia, Canada, the United States, Europe and elsewhere, have demonstrated that *Phytolacca dodecandra* — the endod, or soapberry, plant — contains a toxin lethal to freshwater snails that harbour the parasitic worms that cause schistosomiasis. The tiny flatworms penetrate the skin of people who come in

contact with water in which the worms live. The disease produces symptoms of fatigue, fever and diarrhea, damages the liver, spleen and bladder and can lead to cancer and death. Schistosomiasis affects an estimated 300 million people in the developing world.

Trials are now under way in Zimbabwe to verify whether endod is indeed capable of controlling schistosomiasis. At the same time, scientists are studying other potential uses for endod, perhaps as a botanical pesticide to control zebra mussels in the Great Lakes.

TRADITIONAL SOAP

In Ethiopia, endod berries have traditionally been ground into powder



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The berries of Africa's endod plant contain a natural pesticide that can help control schistosomiasis.

and used as soap. Their molluscicidal potential was recognized in 1964, by Dr Aklilu Lemma, founder of the Institute of Pathobiology in Addis Ababa. He observed large numbers of dead snails downstream from where a woman was washing her clothes with endod powder. In the following decade, Dr Lemma and his colleague, Dr Legesse Wolde-Johannes, conducted detailed studies on the cultivation of endod and its impact on other aquatic organisms.

But their research came to a halt at a crucial stage. When the Ethiopians sought funding from the international donor community to conduct field trials, they were turned down because of incomplete toxicological data. Nor could they interest any multinational companies in underwriting the required toxicological studies.

"Endod can be grown and processed and applied for free by the people who need it," explains John Lambert, a biology professor at Carleton University. Some commercial molluscicides, by contrast, cost more than C\$30,000 per tonne.

After a meeting with Dr Lemma in 1982, Dr Lambert helped persuade IDRC to support the necessary research on endod. The ensuing research was divided between his lab and others in the United States, the Netherlands, and Ethiopia. IDRC coordinated the process of bringing together experts from various countries. They charted the course for developing endod to the point where it could be used safely in community intervention trials. One step along the way was to develop a replicable extract and extraction procedure for

endod using one variety of *Phytolacca dodecandra* and following a standardized method. Then the required toxicology studies were carried out.

The toxicology results agreed with the Ethiopian team's original conclusions — endod powder degrades rapidly in the environment and has little impact on most plants and animals. Indeed, it poses about the same health risk to humans, says Dr Lambert, as ordinary bath soap.

Endod is now the focus of a five year community-based trial in Zimbabwe to determine its impact on schistosomiasis transmission. "We know that endod kills snails. That's easy to measure," says Dr Don de Savigny, principal program specialist in the Health Sciences Division of IDRC. "But what we're really interested in is whether the human disease is controlled. If endod reduces the snail population by 99% and the remaining 1% is enough to keep the disease going, you really haven't changed anything."

While Zimbabwean scientists address this question, a team at the University of Toledo in Ohio is studying whether endod has a role to play in North America. In the 1980s, tiny zebra mussels imported from Europe began clogging intake and drainage systems in the Great Lakes. Lab tests show that at certain concentrations, endod kills zebra mussels and loosens the cement these creatures use to stick to sunken pipes.

Here is proof that the North can learn from the South, comments Dr Lambert. "Third World science is rarely given the credit it's due. But scientists in developing countries have

plenty of good ideas. And they're able to make them work under sometimes appalling working conditions."



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WATER WITHOUT ARSENIC

The altiplano plateau of northeastern Chile is a sparsely populated, desolate area. What little water can be found contains high levels of arsenic, a poisonous element that leaches out of the plateau's volcanic soils.

With no water treatment plants serving the region, local residents drink water containing levels of arsenic up to 200 times higher than the maximum recommended by international guidelines.

But in some quarters, arsenic exposure is decreasing. As a result of a project funded by IDRC, school children there are now drinking safer water that has more acceptable levels of the element. They are the beneficiaries of a portable arsenic filtration device developed in the project led by Dr Ana Maria Sancha at the University of Chile and tested with the help of Canadian researchers.

"It costs only four dollars a month to use and generates around 200 litres of water per day," says Jean-Charles M  ranger, a chemist at Health and Welfare Canada. "It's a very simple system that school teachers can operate."

The device features iron scrubbing pads, located in plastic tubes, that precipitate out dissolved arsenic. Over an eight-hour period, the filtration device can remove up to 96% of the arsenic in a sample of contaminated water —

becoming less efficient the longer it is used, notes Mr M  ranger.

Mr M  ranger taught instrument-based analytical techniques for measuring arsenic levels to Chilean chemists, who then used their new skills to evaluate the arsenic filtration device. The team also examined the arsenic content of foods and soils in different communities to identify other potential sources of arsenic contamination.

REGIONAL CENTRE

This research was extremely sensitive to small errors, says Mr M  ranger. For example, even washing vegetables before analysis presented difficulties. "The arsenic content of the water was so high it actually contaminated the samples," he says. By mastering such challenges, the Chilean team has become a regional reference centre for arsenic determination.

The project also collected detailed information on the health effects of arsenic exposure. A total of 700 people from areas contaminated with arsenic were compared to 175 individuals from a community with relatively safe drinking water. All the participants were interviewed and hair and urine samples were taken to measure their arsenic levels.

Among the group exposed to arsenic, common symptoms of illness included darkened and discoloured skin and scaly lesions on the hands and feet. There was also a high incidence of skin cancer, says Bette Meek, a Health and Welfare toxicologist who helped design the survey.

According to Ms Meek, this information is useful not only for health care professionals in Chile but for researchers in other countries, including Canada, who are currently establishing new arsenic guidelines.

"There's been quite a lot of debate lately concerning how much arsenic is too much," she says. "In Canada, there have been a few instances of arsenic contamination, but we don't have any population exposed to the same degree as in Chile. The Chilean data should help us settle the question."



Luis Lecaros, of the University of Chile, demonstrates the arsenic removal system installed at a school in San Pedro de Atacama, Chile.



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FISHING SOFTLY ON CORAL REEFS

“You place a puck-sized lump of cyanide in the bottom of a squeeze bottle. You fill it with water and spray the contents on a coral reef. Then you scoop up the gasping fish as they come rushing out of their holes.”

Today, this is how most tropical fish begin the journey to home aquariums throughout the world, says Don McAllister, president of Ocean Voice International, an Ottawa-based conservation group. For years, sodium cyanide has played a key role in supplying the multibillion dollar global market for ornamental fish.

Unfortunately, in the Philippines — home to 70% of the world's ornamental fish — widespread use of illegal cyanide kills thousands of tonnes of commercial fish and shellfish every year. Repeated doses are also destroying the coral reefs on which marine life depend for shelter. These coral reefs are important to Filipinos: healthy reefs attract tourists, protect coastal communities from coastal waves, and supply more than half the population's protein requirements.

ALTERNATIVE TECHNIQUE

To end the needless slaughter, Ocean Voice International has joined forces with the Haribon Foundation for the Conservation of Natural Resources in Manila to promote an alternative fish capturing technique. Developed by Dr McAllister and his colleagues, the technique is simple, highly effective, yet non-destructive. Using an ordinary bamboo stick, divers chase fish out of their holes into a transparent net, then catch them with smaller dip nets.

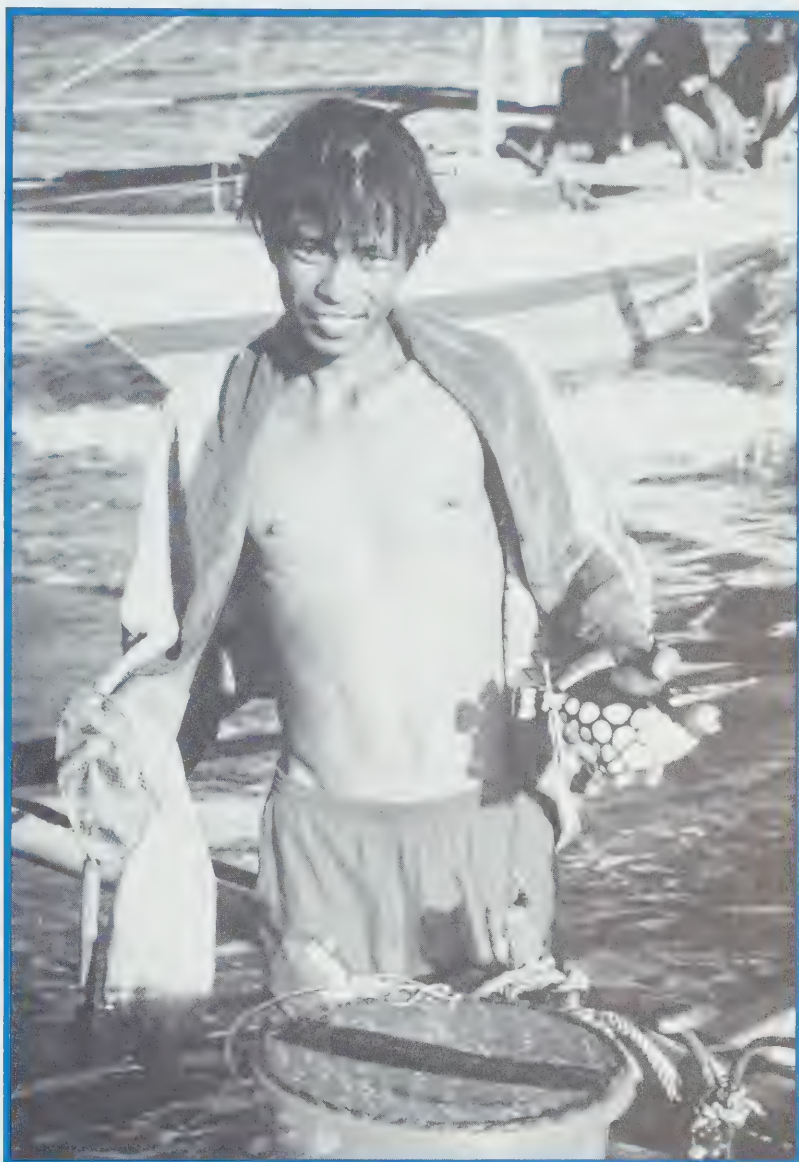
With financial support from IDRC, the partners have developed a two-week course for Filipino fishermen taught by former “cyaniders.” For cyanide users, switching to nets is a logical move, says Dr McAllister. Trained collectors catch just as many fish and their expenses are significantly lower. A year's supply of cyanide costs around \$400, compared

to a mere \$25 per net. Kicking the cyanide habit is also healthy. Some people have been killed and many more have suffered debilitating illness from inhaling cyanide fumes.

So far, the program has reached 500 of an estimated 2500 fish collectors in the Philippines. In communities that have received training, cyanide use has decreased by roughly 80%. “Not

everyone is sticking with the nets, but even those who return to cyanide are using it less,” says Dr McAllister.

To round out the program, the Haribon Foundation hopes to set up community cooperatives that will market fish on behalf of local collectors. “Right now, some collectors are under the control of the aquarium industry. The people selling cyanide



Teaching people to capture tropical fish without using cyanide will save the Philippines' coral reefs from needless destruction.

THE SWEET SMELL OF SUCCESS

are often buying the fish too," Dr McAllister explains.

Haribon also encourages villagers to get directly involved in coral reef management. The group is introducing concepts such as no-fishing zones on damaged reefs. Studies show that if left alone, reefs eventually regenerate and the overall catch increases dramatically.

"When a reef is half dead, the reproductive success of the fish is very low. But if the young fishes are allowed to grow up and lay eggs, their young will hatch. Since most underwater animals produce more young than the habitat can support, the surplus fish will move out into neighbouring reefs and restock them," says Dr McAllister.

According to Dr McAllister, these initiatives will benefit not only collectors in the Philippines but dealers in North America. As coral reefs are restored and cyanide use decreases, the health of captured fish should improve noticeably. At present almost half the fish die en route from the reef to the hobbyist.

In Morocco, there are regions full of wild fragrances where aromatic plants make up a large part of the natural vegetation: sagebrush, rosemary, thyme, verbena, henna, and rose. Cottage industries for extracting essential oils have existed in Morocco since the Muslim conquest in the 7th century AD.

Nowadays, although trucks have replaced donkeys for transportation purposes, the distillers still travel the countryside buying plants and processing them on the spot. Their equipment is obsolete and slow: it also has an unfortunate tendency to overheat, which damages the plants and lowers the quality of the extracted oils. Some of the oil, moreover, is lost during collection.

A team of Moroccan and Canadian researchers, supported by IDRC, have now developed two pilot stills; one of them has a double chamber to avoid overheating and is twice as fast. Other benefits of these stills, which are easy to assemble and transport, are that they can be manufactured by local tinsmiths and use plant residue as fuel, like the traditional boilers. The first model, developed jointly by researchers from Rabat's agronomic and veterinary institute, L'Institut agronomique et vétérinaire Hassan II and the Agriculture Canada Research Station at Saint-Jean-sur-Richelieu, costs only \$2,500. The second model, which is significantly more effective, costs \$3,000. Similar equipment sold by French companies costs around \$200,000.

Ever since the country became a French protectorate in 1912, companies specializing in the export of essential oils have primarily belonged to French nationals. Today, Morocco's entire output is still exported abroad, where it is made into perfume. Many of the foreign companies are, however, fading from the scene.

MADE IN MOROCCO

The Moroccans are taking over the trade: two wholly Moroccan-owned companies have recently been formed, one of which is the direct result of the first phase of the Canada-Morocco project. Others are in the process of being set up, at a time when demand for natural products is rising steeply.

"In the overall scheme of things, this is a small operation," admits Bachir Benjilali, head of the Aromatic Plants and Essential Oils Laboratory at the Institut agronomique et vétérinaire Hassan II in Rabat. "But this activity provides work, and hence an income, for hundreds of thousands of people for several months a year. Just imagine, to export our 60 metric tons of rosemary oil a year, 15,000 tons of the plant must be picked, cut, gathered and distilled between May and October. The same is true for other plants. In some villages, over 70% of total income comes from rose bushes, although the harvest period is very short — barely a few weeks."

It is hardly surprising that the study of aromatic and medicinal plants is one of the priorities of Morocco's development plan. The study could be of great benefit to small stockbreeders and farmers in mountainous and semi-desert areas. These are people who traditionally followed their flocks of sheep and goats but are now encouraged by the government to settle. This sometimes has a devastating impact on the fragile environment owing to overgrazing, use of plants for fuel, erosion caused by ploughing, etc.

"We recognized that the traditional distillation method involved a great deal of waste," adds Professor Benjilali, himself the son of a peasant farmer from the Tangiers region. "In addition to improving the stills, we were able to study the effect of the various distillation processes, both with regard to the yield of essential oils and their commercial quality. The results are extremely encouraging."

The project team now has a clearer understanding of the composition of plants and their essences (or oils), as well as the impact of cultivation techniques on plants and their yields. It was discovered that different varieties of the same plant contain different essential oils; this led to the development of special



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Artemisia is one of Morocco's many aromatic plants. Its cultivation will supply the essential oils industry and preserve biodiversity.

formulas for mixing oils from various regions and the creation of a consistently higher-quality product. The researchers even identified constants in the speed of the chemical reaction from one variety of plant to another, thereby establishing ideal temperatures for distillation and increasing the ultimate yield of essential oils, as well as improving their composition and quality.

The researchers were also able to improve their knowledge of the effects of the desiccation of plants on the yield and quality of essential oils. They even discovered that a short period of drying increased the level of essential oils in several aromatic plants. Verbena, for example, yields 70% more essential oils three to five days after it has been harvested.

Verbena oil has, moreover, been chemically described for the first time anywhere in the world and improved techniques have been developed for cultivating the plant, which grows in oases in the shade of date palms. Some verbena oil distilled in Morocco has even been sold in France; this is a first, because the local people had hitherto been content to export the dried leaves to France. Potential income per hectare has accordingly increased by 400%, much to the delight of the local farmers.

The same is true for sagebrush. Although Morocco has ten million hectares of wild sagebrush, on which flocks of sheep graze, not all of it yields essential oils of the same quality. The project enabled researchers to identify a large quantity of sagebrush rich in alpha-thujone in the Errachida region. This discovery is of great practical interest, since mixing the essential oils of camphor sagebrush (abundant in Morocco) with those of alpha-thujone sagebrush produces a standard essential oil that is much sought after by perfume makers.

FROM MOROCCO TO QUEBEC

Efforts to improve the essential oils industry in Morocco were supported by Dr André Bélanger of Agriculture Canada from his research station at Saint Jean-sur-Richelieu, Quebec.

Dr Bélanger conducted chemical analysis on samples of the aromatic plants from Morocco to measure the "volatiles" — the substances we can smell — in the plants. Using gas chromatography, Dr Bélanger identified precisely which chemical compounds are present in the essential oils of different varieties of aromatic plants. Dr Bélanger also worked with Moroccan students and researchers who came to his laboratory for training in current techniques in chemical analysis.

For Dr Bélanger, working with Dr Bachir Benjilali and other project participants has been a rewarding experience. "It creates a kind of friendship and collaboration. We call each other with our research problems."

Dr Bélanger says the expertise he has acquired in aromatic plants can be applied in Canada. People are looking for plants that could replace the cultivation of tobacco, he says. The research could also lead to the development of pesticides based on the natural substances in aromatic plants, says Dr Bélanger.

THE BATTLE AGAINST DESERTIFICATION

The chemotaxonomy of sagebrush has been enriched; six new chemotypes have been catalogued. The origin of the chemical polymorphism



Dr Bachir Benjilali (left) examines a distilling condenser at the tinsmith's shop.

of this species has been explained: researchers have proved that it was of genetic origin and not the result of environmental influences. It was therefore easy to identify the variety of sagebrush producing the strongest concentration of alpha-thujone, to grow it and remove its seeds for subsequent sowing by aircraft over the country's vast desolate areas. This procedure is of added interest because sagebrush binds the soil and is proving a valuable ally against desertification.

"A door has opened on the future," claims Professor Benjilali, who has been studying aromatic plants for 13 years and has even greater hopes

for the second phase of the project. "The peasants worked ... without using any cultivation techniques. As a result of Phase I, yields have increased threefold and an excellent-quality product has been obtained. Phase II, in addition to allowing us to conduct an in-depth study of the ecosystems associated with aromatic plants and the impact of harvesting them, will finally give us an opportunity to improve the techniques for the cultivation, distillation and development of the end product. We will disseminate the findings to local farmers, cottage industry, industrial users and potential customers abroad. Everyone will benefit!"



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TOOLS FOR ECONOMIC STABILITY

From 1960 to 1980 the economy of the Ivory Coast grew rapidly at a time when its cocoa and coffee exports earned large amounts of foreign exchange. But when commodity prices crashed in 1980, the Ivory Coast, like other developing countries, was saddled with high foreign debts.

However, since the country could not raise the extra tax revenue to pay these debts, the foreign deficit soon became a fiscal or government deficit. The result was major fiscal instability, with a government budget deficit climbing to over 10% of gross domestic product.

In order to minimize the effects of fiscal instability induced by events such as a debt crisis, researchers in seven developing countries, allied with colleagues at the University of Western Ontario (UWO), are trying to design tax structures and other economic tools suited to developing countries.

Dr Guillermo Perry of Colombia's Foundation for Higher Education and Development (FEDESARROLLO) and Dr John Whalley of UWO's Centre for the Study of International Economic Relations (CSIER) are coordinating the cooperative project with researchers in Argentina, Colombia, Ivory Coast, Mexico, the Philippines, and South Korea. The main goal of the project, funded by IDRC, is to help improve fiscal reform by combining quantitative analysis of the economic effects of fiscal reform with an institutional analysis of the political and administrative problems faced by tax reformers. Dr Perry is organizing and monitoring the institutional analysis.

Part of the research looks at fiscal reforms introduced or imposed on many developing nations as a result of the debt crisis. One such reform is the emergence of value-added taxes (VATs) in nearly 70 countries. Fifteen years ago only a handful of countries imposed VATs.



Philippines vendor. Analyzing the impact of fiscal and tax reforms can help build more equitable tax structures in developing countries and improve economic stability.

HOW SUCCESSFUL?

The taxes were meant to ease the fiscal crises in many developing countries. However, there has been little analysis of their success in raising revenue or promoting economic efficiency, long-term economic growth, and income distribution. Policy makers need to know whether the rich or the poor reap more benefit from economic policies such as VATs. This analysis will help build more equitable tax structures.

Dr Whalley is training researchers from the seven countries in computer-based general equilibrium modelling. These systems allow researchers to break down the economic performance of their countries and measure the impact of fiscal and tax reforms.

"There are a number of modelling projects being undertaken by developing country scholars. They're trying to develop model-based analyses of the impact of tax reforms in their own countries. We're basically assisting and helping them," says Dr Whalley.

The researchers visited Dr Whalley's lab for a month to learn to use the modelling techniques. In 1993, the

participants will return to UWO to present their preliminary findings, followed by a formal meeting in September in New Delhi.

Dr Whalley says capacity building is a major goal of the project. "There is a real feeling that these models being developed could grow into multi-purpose kinds of models," which the researchers will use to address other problems.

He also stresses the importance of South-South linkages. "It's amazing when you go to meetings in the developing world and you realize that many countries' scholars have not been to other developing countries."



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**Farming in the City:
The Rise of Urban Agriculture**

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FOCUS

Millions of people in the growing cities of the South have become urban farmers in recent decades. They grow vegetables, raise livestock, poultry and fish, and practise many other types of agriculture. Researchers are paying increasing attention to a sector often neglected by governments, one which can contribute greatly to the sustainability of cities. The practitioners of urban agriculture need no convincing about its merits. They enjoy better diets, higher income, employment or combinations of all these benefits.

Recent research into urban farming — highlighted in the following pages — shows that it also brings major benefits to the urban environment. Apart from improving local food supplies, urban agriculture puts marginal lands to good use and absorbs wastes in the form of compost and fertilizer. It can also have a positive impact in matters of water and energy management.

Encouraging urban agriculture reflects a new vision of the city. It is seen as part of the natural resource base and as a producer of agricultural goods rather than only as a consumer. Planners and policy makers are presented with the opportunity to maximize the potential for food security, better nutrition, income generation, employment and more sustainable cities.

Editor-in-Chief



Gorée, Senegal

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URBAN FOOD SELF-RELIANCE: SIGNIFICANCE AND PROSPECTS

Food insecurity is drawing more and more people in Southern cities to the burgeoning practice of urban agriculture — the production of food and non-food crops and animal husbandry in built-up areas.

For the urban majority of poor people in the South, food is turning into a very expensive commodity. In 1990, households in nearly half of the developing countries' largest cities were spending 50-80% of their average income on food. Surveys from the late 1980s in Kenya, Egypt, India, Bolivia, Bangkok, La Paz, Bamako and Dar es Salaam, show that poor urban households spent around 60% — and

in some cases as much as 89% — of their income on food.

When it comes to food, poor people in cities have fewer coping strategies than rural inhabitants. Price surveys of five developing countries showed that city dwellers paid between 10-30% more for their food than rural dwellers. The notion of urban privilege over rural neglect appears ill-founded when as much malnutrition prevails in large primary cities as in rural areas of some countries.

The practice of producing food in cities dates back to Incaic, Aztec and Mayan cities, early Javanese and Indus settlements, and towns of the Tigris and Euphrates. In our era, more advanced urban agriculture is typically found in Asian cities, where policy-makers and planners have for some

time accepted and promoted food production as a critical urban function.

Urban agriculture has been expanding since the late 1970s in many parts of the developing world. Multiple factors come into play: rapid urbanization, ineffective agricultural policies, crippled food distribution systems, withdrawal of subsidies, reduction of wages, inflation, unemployment, lax urban regulations, civil strife and droughts.

Most urban agriculture still remains largely unrecognized and unassisted if not outlawed or harassed, even in years of food shortage. But more governments are creating agencies to manage this activity and actively encourage it. Between 1975 and 1985 governments in at least ten Asian, six African and six Latin American



Gorée, Senegal. Around the world, some 200 million urban dwellers grow food for household consumption or for extra income.

IDRC: Denis Marchand

countries supported such initiatives in a variety of ways.

Globally, about 200 million urban dwellers are now urban farmers, providing food and income to about 700 million people. In Dar es Salaam in 1980, 44% of low-income earners had farms, but by 1987 70% of heads of households engaged in some farming or husbandry. During the 1980s, 25% of all urban households engaged in food production in the US, compared to 57% in six Kenyan cities, with other city-specific figures ranging from 32.6 to 70% for Kisangani, Kampala, Lusaka, Moscow (1991) and Dar es Salaam. Cairo in the early 1980s had at least 80,000 households raising animals at home.

IMPORTANT CONTRIBUTION

We now can say that such agriculture often makes a significant contribution to many major cities' food self-reliance. In some large Latin American centres a third of vegetable demand is met by urban production. Cities such as Kathmandu, Karachi, Singapore, Hong Kong, Shanghai and others in China produce between 25 and 85% of their supply in vegetables and fruits, while Hong Kong, Kampala and Singapore raise between 70 and 100% of the poultry they consumed. Some cities even manage to export products to other countries.

Although the agricultural potential of cities is clear, development policies nurturing rural-urban dichotomies have been needlessly starving cities; by 1980 nearly half of all food consumed in developing countries was being imported from other countries and weakened urban food supply systems are now causing renewed concern. Urban agriculture now gives us good reasons for recognizing the comparative advantages of rural and urban areas in meeting large cities' growing needs for reliable, cheap supplies of sufficient and nutritious food.

Apart from nutrition and health, farming in cities contributes to producers' well-being in a number of ways, including cash-saving and income generation. Among the lower-income groups, self-produced food can cover a considerable share of a household's total food intake and can save cash income that otherwise



Although most large cities of the South contain ample land for cultivation, it is sometimes inaccessible due to local zoning laws.

would be spent on food. Depending on the income group, self-produced food is found to account for between 18 and 60% of household food consumption in East Jakarta, Dar es Salaam, and Kampala. Home-produced food enables families in Addis Ababa cooperatives and Dar es Salaam's poor families to save 10-20% and 37% of their income, respectively. In Bolivia, urban food projects supply women producers with a quarter of their total income.

The impact of this activity on households' nutritional status is under-researched but the data available is encouraging. According to a 1981 UNICEF survey of households with children in 13 low-income districts of Kampala, partial reliance on intra-urban food production largely explained why supplementary feeding aid could be discontinued, despite dramatic economic decline. Thus conventional urban food security strategies need to be reassessed in view of the potential of city farming to augment the real income of low-income households at levels equivalent to food subsidy programs, doing so at much lower cost and with many other benefits.

THE SCALE OF CITY FARMING

Tailored surveys reveal that the area devoted to agriculture in cities is much more than indicated by most urban land use classifications. For instance, some 60% of Greater Bangkok was officially under urban agriculture in the 1980s. Agriculture is found on land unsuited to building, undeveloped land, idle public land and bodies of water, and household spaces. Urban farming thus does not obstruct more appropriate land development; rather it puts to use small, inaccessible, unserved, hazardous, and vacant areas.

The adaptability of this agriculture is due to a range of farming systems and crop selection that make the best of site and locational constraints and resources in the urban fabric. One UNDP survey identified over 40 farming systems, including aquaculture, horticulture, livestock, agroforestry, silkworms, and medicinal and culinary herbs.

Urban agriculture is clearly far more than a means of subsistence, an informal activity, or an illegal business. The UNDP survey identified seven urban farmer categories, ranging from low-income survival to middle-income home gardeners to agribusiness. In

Bangkok, a single large firm contracts some 10,000 outgrowers of chickens.

Owing to its considerable resource needs, city farming is not the business of recent immigrants from rural areas. More than 60% of Lusaka's farmers had been in the city for more than five years before starting their plot gardens, and nearly 45% for more than ten years. In Lusaka, Nairobi, Freetown, Ibadan, and Dar es Salaam, the majority of urban farmers waited at least five years before initiating farming in the city and most were longtime residents by the time of the surveys. Most urban farmers have other part or full-time jobs.

INFORMATION FOR URBAN AGRICULTURE DEVELOPMENT

Throughout the 1990s, research on urban agriculture will probably lead toward more multidisciplinary and policy-oriented efforts via regional and global networking. Several aspects of it require attention by researchers, coupled with changes in urban environmental management.

Comparative and Longitudinal Impact Studies

There is a marked lack of longitudinal and comparative analysis between

In some large Latin American cities, one-third of the demand for vegetable produce is supplied by urban agriculture.

farming and non-farming households that examines nutritional status and strategies of the urban poor to cope with food insecurity. More generally, systematic comparisons of cities that analyze the impact on nutrition, income, employment, health, waste and other environmental management issues are needed.

Technologies

Urban agriculture requires higher technological and organizational precision than rural agriculture because it needs to be more intensive, more tolerant of environmental stress, responsive to market behaviour, and carefully monitored to protect public health. Many highly valued systems

must be adapted to smaller-scale operations, such as hydroponics and stall feeding. Where poorer urban households have little land, technologies must be adapted to make more efficient use of tiny household spaces.

The Urban Ecosystem and Economy

More thorough accounting is required of the costs and benefits associated with urban agriculture, both as a land use (including environmental, social and health benefits) and as an industry (job multiplier). Various methods exist to assess the value added to land and the savings to the private and public sectors. Such assessments should help argue for savings in land investment and management either through incorporating city farming in conventional land uses or assigning land in new developments and laying out utilities accordingly.

A further area of investigation is quantifying the employment and income associated with this activity. Street-food vending, for instance, is a bustling yet repressed business that is a critical feeder of specific groups, often an important employer, and run largely by women.

Leading Urban Agriculture into the 21st Century

Urban agriculture is capturing growing attention among international bodies. After the East-West Center's initial survey of the practice in the Pacific Basin, IDRC held a seminar in Singapore and commissioned a worldwide literature search from the Urban Resources Centre in 1984. In the later 1980s, UNICEF implemented various projects and IDRC funded four studies in Kenya, Uganda and Tanzania. By 1988, the UN University's Food-Energy Nexus Programme had published a series of research reports in selected regions, countries and cities. Related research was carried out by the Cities and Ecology Project of Man and Biosphere/UNESCO. Building on this, the UNDP's Urban Agriculture Network surveyed 21 countries in 1991-92 and convened interested agencies to effectively promote UA development, including wastewater farming and hydroponics. Components of the reputed CGIAR system (i.e. International Food Policy Research Institute) are assessing the potential for more comprehensive food security strategies. Development NGOs are already active, particularly in Latin America,

with others reviewing their rural record and current expertise to better shoulder urban agricultural development. In 1992, the Toronto-based Developing Countries Farm Radio Network released four radio scripts on urban farming for broadcast in developing countries. UNICEF is reviewing its own project experience for future policy directions. Major UN programs (e.g. Healthy Cities of WHO and Sustainable Cities of UNCHS/UNDP/WB) now provide operational frameworks for urban agriculture research to guide better urban management. Since early 1993, IDRC's Urban Environment Management Program focuses on water-waste-agriculture linkages in cities. In mid-1993 various agencies and Northern and Southern country specialists met at IDRC in Ottawa to identify key information needs and collaboration mechanisms. IDRC has about CA\$1 million in active projects on urban agriculture production and urban nutrition; many past studies have tested links between waste treatment and recycling with farming, others have analyzed urban food circulation systems.



Yue-man Yeung

Guangzhou, China. Asian cities promote food production as a critical urban function.

Access to Land and Credit, and Crop Security

The amount of vacant and under-utilized land suitable for agriculture was enormous in most large cities in the 1980s: 200 km² in Greater Bombay, 338 km² in Bangkok, 203 km² in Metro Manila, as much as 600 km² in Sao Paulo, and 4850 ha in Karachi. The real problem is lack of access to land. Surveys have found that improving access to land would lead current farmers to expand operations and prompt many non-farmers to begin farming. People may be prevented from farming their own land by zoning laws. Farming often takes place on land or water where crop security and usufruct rights are at issue. Thus, there is a need to support local authorities, NGOs and communities groups in improving access to land, through usufruct and leasing agreements, multi- or flexi-zoning, agro-residential planning, land leasing and land banking.

Agricultural credit is almost universally unavailable to urban farmers, even when credit is granted to poorer urban businesses and when city farming holds lower risks than rural farming. The lack of credit results in high

failure rates, low yields, intermittence, and non-investment in higher-yielding systems. Current credit programs to housing and small enterprise development could be re-oriented, particularly those targeting female micro and small entrepreneurs.

Waste and Health Risks

Urban agriculture could further reduce its use of high-quality water if sewage systems were designed to recycle sewage locally. Irrigation with untreated wastewater is a problem that requires the adaptation of low-cost pathogen and vector elimination processes and assessments of crop susceptibility to contamination. Research results could guide crop selection accordingly; for instance, whether to plant food crops or non-food crops.

Solid waste is already used in a variety of ways but the practice should be further encouraged. Current centralized management systems may hinder solid waste reuse for city farming, as solids are dumped at sites with restricted access and wastes are unsorted. Pollution of the water table and soil from agrochemicals could be curbed by the use of biological insecti-

cides, multicropping, compost and treated sewage.

Equity Aspects

More research is needed on those who stand to benefit from expanding and improving city agriculture, with particular attention to gender and ethnic inequities. Immigrant minorities often are major agents of technological transfer but are frequently neglected by ruling groups in host urban settings. Depending on a range of factors, women may make up half — if not the majority — of urban farmers, yet very few studies have focused on the needs of women in urban agriculture.

Luc J.A. Mougeot, PhD., Program Officer, Urban Environment Management Program, IDRC.

Copies of Dr. Mougeot's article, complete with full references and bibliography, are available by writing directly to: IDRC Reports Magazine, PO Box 8500, Ottawa, Canada K1G 3H9.



NEW CHALLENGES FOR CHINA'S URBAN FARMERS

Unlike universities in most countries of the world, the campus of Beijing University includes several irrigated rice fields — farmers have been harvesting rice there for generations.

Mixing farming and urban activity is typical of Chinese cities, each of which is completely self-sufficient in food production. Enough fruit, vegetables, grain, fish, livestock, poultry, and trees are cultivated within each city boundary to provide millions of Chinese with an adequate, affordable, and accessible supply of food. But urban agriculture is threatened by China's open economic policy. Since 1978, residential and industrial development has increased rapidly in urban areas, encroaching on valuable fertile land.

With more than one billion people, "China's concern has been how to feed its population, particularly those who live in cities," says Dr Yue-man Yeung, a specialist in urban agriculture at the Chinese University of Hong Kong, and participant in an IDRC workshop on urban environmental management held last May. This concern predates the Communist regime, which came to power in 1949, as does a government policy of supporting urban self-sufficiency in food. A 1953 study shows that by the early 1930s, Shanghai was able to feed its three million people with food produced within a 100-km radius. The Chinese government has built on this concept of self-sufficiency to keep pace with a growing urban population.

The lack of refrigerators in Chinese households means there is a constant need for daily supplies of fresh food. City farming addresses this need while also offering several economic advantages. For one thing, city-grown food is relatively inexpensive, especially important for the poor. According to Dr Yeung, "the nutrition of the urban poor

depends on sufficient food being available at the marketplace at prices they can afford."

When food is grown close to its source, transportation costs are minimized — farmers typically bring their produce to market on foot or by bike or cart, keeping food prices low. Moreover, the government has discouraged regional trade in food because of high associated costs, such as refrigerated transport. These factors help reduce the gap in food prices between urban and rural areas. In most developing countries, by contrast, food is considerably more expensive in cities than in the countryside.

Urban agriculture also provides a decent income for farmers living on the outskirts of Chinese cities, an incentive to keep working in the agricultural sector rather than migrating to jobs in the cities' crowded cores.

Most urban farming takes place in the cities' "inner" and "outer" suburbs. Perishable vegetables, such as beans and

cabbage, are grown in inner suburbs — those areas within 10 km of city centres. Most of these vegetables are sold about 10 to 15 hours after harvest. Hardier vegetables, including carrots, radishes, onions, and potatoes, are produced in the outer suburbs. These extensive suburbs are key to urban farming in China and the government has extended municipal boundaries to encompass agricultural land. "The cities are overbound so that they will have enough space for the production of food," says Dr Yeung. For example, Shanghai's boundaries were increased tenfold in 1958 to cover 6000 sq km.

INTENSITY AND RECYCLING

The land in the suburbs is intensively farmed. In Guangzhou in southern China, a single field can produce up to nine crops a year. Such concentrated use means that soil fertility must be continually renewed. It is done through the recycling of waste, a traditional Chinese practice. Recycled human waste, in particular, has long been used in urban agriculture. The waste is



Yue-man Yeung

Human wastes are collected from households and carted to treatment sites, prior to application as fertilizer in gardens.



Yue-man Yeung

Guangzhou, China. Development pressures from new housing and economic activity are reducing the amount of urban agricultural land.

PRODUCING MORE WITH LESS

According to Dr Yue-man Yeung, the future of urban agriculture exists today in many Asian mega-cities, where competition for land demands new products, techniques, systems and policies. Hong Kong is resorting to poly-aquaculture integrated with animal husbandry, technically improved livestock farming with local breeding stocks and cheap feed supplies, leading to fewer and larger chicken

and pig farms using massive amounts of urban food wastes. Singapore's policies emphasize self-sufficiency, no subsidies, and fully commercial farming businesses. Vegetable output has kept up despite the acreage reduction thanks to multicropping methods, hydroponics and short-growing varieties. In some cities, such as Shanghai, urban food circulation systems are now highly integrated:

the control of production, distribution and marketing is centralized, with coordinated regional management superseding fragmented individual decision-making. Metro-wide planning and fiscal instruments are being introduced to accommodate farming within industrial, institutional and commercial land uses.

Luc Mougeot

collected from households and taken to a cesspool. Once it is rid of pathogens, it is applied to the fields. Dr Yeung says, however, that this practice is becoming less common with the growing popularity of chemical fertilizers.

Another example of organic waste recycling is found in the Pearl River Delta of Guangdong. Reclaimed 600 years ago, the delta now supports an integrated system of agriculture and aquaculture, known as the mulberry-dyke fish-pond system. Briefly, mulberry trees are grown to feed silkworms and the silkworm waste is fed to the fish in the ponds. The fish also feed on waste from other animals, such as pigs, poultry, and buffalo. The animals in turn are given crops that have been fertilized by mud from the ponds. Dr Yeung describes this sophisticated system as "a continuous cycle of water, waste and food... with man built into the picture" as both farmer and consumer.

THREATS TO FARMLAND

China's recent economic growth, however, is threatening this efficient ecological cycle. Massive tracts of fertile land in the Pearl River Delta have been lost to industrial development and concentrated housing, a trend mirrored elsewhere in the country. Dr Yeung warns that "this is something the Chinese will have to watch because once the land is converted (for residential use), it cannot be converted back to agriculture." Mindful of this, the government has urged peasants in Beijing to build space-saving, two-storey homes.

Even where city farming is successful, its rate of growth trails that of the industrial sector. In prosperous Guangdong province, Dr Yeung estimates that industrial output has increased by 160% over the last decade, compared with a 40% rise in agricultural productivity.

INDUSTRY AND POLLUTION

A second threat to urban agriculture concerns industrial development. As the numbers of factories increase, so does pollution, worsened by the relative lack of pollution con-

trols. The effects are felt in the Pearl River Delta, where the leaves of the mulberry trees show traces of contamination. The silk worms are dying after eating the leaves and silk production is dropping. Farmers are turning to other, more pollution-resistant crops like sugar cane and bamboo.

Changing conditions in urban farming are causing other adjustments. A 60% gap in revenues between growing vegetables and growing grain in Shanghai has prompted farmers to switch to the higher-value crop. Farmers are also increasingly supplementing their earnings with income from other activities, such as factory work.

Dr Yeung feels these changes merit further study. The actual science of food production has been well documented but other issues have been neglected. These include the impact of the increased use of household appliances such as refrigerators, the modernization of traditional farming practices, the growth of non-farming jobs in rural areas and the transformation of household labour.

A greater focus on research in urban agriculture is also important in light of the world's changing demographics. "The world is going to be more and more urban," says Dr Yeung. "For the first time, by the end of this century, there will be more people living in cities than in rural areas." The amount of land devoted to urban farming will undoubtedly shrink, just as the need for food in cities becomes more pressing.

Jennifer Pepall in Ottawa



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A PLOT OF ONE'S OWN IN WEST AFRICAN CITIES

The world's cities are surrounded by countryside and produce astonishing amounts of vegetables, fruit, cereals and even fish and meat. Even in the cities, people grow corn and sorghum, farm carp, and feed chickens, pigs, goats and rabbits — when they are not lovingly tending delicate orchids.

In the developing world, urban farming is fast becoming a tangible, cost-effective way of responding to the overwhelming problems of resource scarcity and waste management. It is, at least, the beginning of a solution — an original strategy to ensure the survival of the millions of economic casualties of today's impoverished, recessionary economies. Urban agriculture is undoubtedly more widespread than is acknowledged; it has become a ubiquitous, complex and dynamic feature of the urban and socio-economic landscape in Africa, Asia and Latin America.

"FARMING ON OUR DOORSTEP"

Urban farming is very common in African cities, and with good reason. Urban orchards and market gardens make Mali's capital self-sufficient in citrus fruits and vegetables. The same is true in Togo, where the capital, Lomé, grows enough vegetables to meet its own needs.

"In the African cities, a large amount of land is used for farming in and out of season," explains Souleymane Diallo, Research Coordinator with ENDA (Environnement et Développement du Tiers-Monde) in Senegal. "Farming on our doorsteps can now be found all over our cities. The local people are slowly learning the tricks of the trade, particularly as far as out of season cultivation is concerned. This takes time, however, because produce is traditionally grown only during the rainy season."

Mr. Diallo, who has been commissioned by IDRC to catalogue research on urban farming in West Africa, nevertheless feels that we must remain objective when trying to assess its potential. He says that he even sees a link between the development of urban farming and the increasing

poverty of African countries: "Urban farming undoubtedly creates jobs, but at what cost? The countryside is emptying out. A city like Bamako, for instance, is currently experiencing a population growth rate of 8% a year! It's hardly surprising that migrants are turning to urban farming, since there are no other jobs."

"We must nonetheless recognize that this form of farming is extremely useful," he adds, "It has even changed the food eaten in the cities: carrots, peppers, cucumbers and lettuce can be found today, although they were previously unknown."

JOB CREATION

Urban farming takes hold first in high-density areas. This is hardly surprising: in several African cities, poor households, who spend over half their income on food, have an interest in becoming involved in it. The women especially have made it their "business." A not inconsiderable benefit is that urban farming generates income and jobs for artisans (blacksmiths, masons, carpenters, etc.), as well as in the service sector (transportation of fertilizer, plant-health products and

FARMING ON DAKAR'S EDGE

Nearly 200 men and women grow three vegetable crops per year in the interdunal depressions of Tanibou-Dabo, Hann and Patte d'Oie-Grand Yoff to supply the Dakar market. On a water catchment concession of the Service National d'Exploitation des Eaux du Sénégal (SNEES) currently not in service at Grand-Yoff, they do so free of charge. In return they guard the pumping facility against vandalism.

The farmers extended a network of channels and tanks out from the station's well to ease crop watering. The water table is at a depth of 2 to 20 m. Crops are sequenced from the bottom to the top of the depression. Corn, vegetables, produce and tree nurseries are placed close to the well and canals, and full-grown mango and cherry trees are sited on high ground.

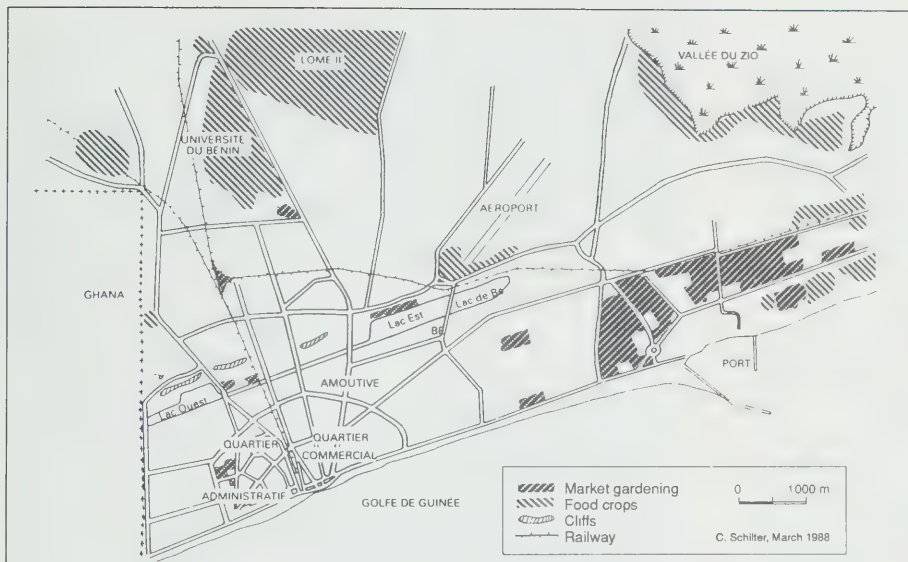
Fenced with used tires and discarded packaging, these fields lay next to a large collection of plank and tin pens where barricaded pigs feed on domestic wastes. A fish-smoking compound is also built and fuelled from city wastes. The operation produces fish esophagi that are sold to Japanese pharmaceutical companies, the manager said.

Luc Mougeot



Gardens on the outskirts of Dakar, Senegal

IDRC: Luc Mougeot



Lomé, Togo is nearly self-sufficient in vegetables and other food crops. They are planted on unbuilt land near major transportation corridors and institutional settings such as railways, the airport, seaport, and university. Streamsides and flood-prone areas are also cultivated.

Source: Schilter, C. 1991. *L'agriculture urbaine à Lomé*. Paris-Genève: Karthala-IUED.

seed, distribution of mechanical pumps, etc.) and marketing.

Urban farming, however, also has its limits. Since it generally occurs on "precarious" land, — i.e., land whose availability depends on the whim of city planners — the long-term viability is not always clear. Tolerance of city farming thus varies from place to place. Despite successful results, the authorities in Bamako, for example, have banned the cultivation of cereals since 1989 on the grounds that the tall stalks provide hiding places for bandits. Likewise in Bafoussan, Cameroon, where the mayor had all the corn plants cut down, supposedly to make the town a healthier place.

Only two African countries have so far officially come out in favour of urban farming: Zaire, which introduced it as an official project with outside financial assistance, thereby subsidizing access to water and drainage; and Nigeria, which has made all inputs (fertilizers, seed, etc.) tax free.

Limited access to good water for urban farming creates enormous problems in sub-Saharan Africa. In many cities, traditional wells are often still in use. Some stopgap remedies, primarily the use of polluted water, expose

producers and consumers to potential dangers. The risks are real: soil contamination, ground water pollution, traces of heavy metal in vegetables, etc.

"People often do it without being aware of the risks involved," explains Mr. Diallo. "People water their gardens with contaminated water. Thus in Dakar and in some parts of Lomé, the people use sewer water to water their crops. As it is intensive farming, moreover, more inputs are needed, thereby polluting the land and the ground water. We still do not know its full impact."

Certainly, the environmental impact of urban farming still has to be explored in West Africa, as elsewhere in the world. If current trends persist, over half the world's population will live in cities in 20 years' time. Ecologically viable urbanization thus seems impossible without urban and peri-urban farming, which increasingly appears a worthwhile way of processing waste into food and creating desperately needed jobs.

André Lachance in Ottawa



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FARMING LOGIC IN KAMPALA

For residents of Kampala, Uganda, access to arable land in the city — no matter how small an area — is the key to better living. A study of health and wealth shows that the majority of families who can plant a few crops or raise some livestock in the city thereby ensure their well being.

The study by Prof Daniel G. Maxwell finds that an estimated 30% of all residents take part in urban agriculture. Those households involved in urban farming show a significantly improved level of health among women and children. Prof Maxwell's study also reveals that most crops in the city and on the immediate periphery, or peri-urban areas, are staple foods such as cassava, cocoyams, matooke (plantain), maize, and beans. Vegetables such as traditional greens, cabbage, tomatoes, and onions are not grown to any great extent. The livestock of choice is chickens.

THE FOUR LOGICS

In his research, Prof Maxwell identifies four logics, or rationales, for participating in urban agriculture: commercial production, self-sufficiency, food security, and no other means — or simple survival.

While there are scattered examples of commercial cultivation of exotic crops such as coffee or vanilla beans in Kampala, the largest category of production is livestock, particularly poultry. Prof Maxwell estimates that 70% of all chickens and eggs consumed in the city are in fact produced there. But he points out that contrary to earlier theories that these entrepreneurs developed from small, home-consumption operations, this has not necessarily been the case.

"For some, it was a matter of smart investment," says Prof Maxwell. He studied several poultry producers and quotes one as saying, "we realized that we could positively earn income from this agriculture ... when I left banking in 1988 ... I was given two million shillings (US\$10,000 at the time), and we invested it in poultry." Interestingly, these commercial entrepreneurs include both men and women, usually from households with high income levels and access to credit, according to Prof Maxwell's research.

HOUSEHOLD SELF-SUFFICIENCY

Food self-sufficiency is taken to mean the ability to provide all the staple foodstuffs and sources of protein independent of outside help, except in the event of poor growing seasons or drought. While self-sufficient households may still buy some food, they are largely insulated from the high cost of living in Kampala. Prof Maxwell estimates that such households must have access to two to five acres to achieve this level of self-sufficiency. "Once family needs are met, the extra food is sold," he says.

"Almost without exception, the land used for growing is not owned by the family," he says. It could be leased from the city or from landowners. Some households claim squatter's rights on plots of land. This type of access to land is possible only for well established households that have

long-term relations with urban land owners, says Prof Maxwell.

By far the most common rationale for urban agriculture is food security. Prof Maxwell says most families buy the bulk of their food from markets. But eventually one or more members of the household manage to gain access to some land, and work it to provide extra food for the table, and to have a food supply to draw on in case of emergency.

Such family gardens range in size from 100 square metres to as much as one-quarter of an acre. "That's not enough to live off," notes Prof Maxwell. Unlike the households following other rationales, Prof Maxwell says that those who fall into the food security category rarely sell the food they produce. Such families have income from jobs, and they consider it a priority to preserve that income for non-food expenditures.

A final rationale for urban agriculture is related to food security, but is practiced by households with fewer means. These are families that engage in urban agriculture simply to survive. "They don't have a choice, they don't have any other source of income or livelihood," says Prof Maxwell.

Among those who turn to urban agriculture for survival are "low-income, female-headed households, widows, and families abandoned by a primary wage earner," says Prof



A steep slope unsuited to anything but cultivation can make a difference to families striving to earn cash or improve their diets.

IDRC: Luc Mougeot



IDRC: Luc Mougeot

Urban dwellers become farmers for four main reasons: commercial production, self-sufficiency, food security, or simple survival.

Maxwell. This group is often forced to sell some of what it produces, to pay for other needs.

COLONIAL-ERA BYLAWS

Prof Maxwell's research went beyond fact-finding to address the sometimes prickly issues that surround urban agriculture in Uganda. According to Prof Maxwell, urban farming is contentious primarily because of Uganda's history.

"Municipal bylaws, dating from the colonial era, ban cultivation in the city, with the exception of small vegetable gardens and flowers. Residents aren't allowed to keep any livestock at all, unless they get permission from city council," he says. "People farm in the city at their own peril. Technically, their crops and animals could be seized or destroyed, and they could be evicted."

Despite the narrow regulations, most farming in the city is widely tolerated in practice, since bureaucrats look the other way. "No one has been thrown in jail," says Prof Maxwell. "But, it could happen."

One of the problems facing urban agriculture stems from people's perceptions of what a city should be, that in a city residents do not engage in agriculture, he says. "While people have changed their attitudes, people in charge still have archaic ideas. It's these attitudes that are behind the legalities."

Prof Maxwell notes that official resistance to urban farming revolves around environmental, health, and safety concerns. Government authorities fear that unconfined livestock could spread diseases such as salmonella and brucellosis. They also fear that by allowing livestock, drainage projects could be compromised, thus contributing to the spread of malaria, says Prof Maxwell.

Prof Maxwell considers some government objections to urban agriculture to be farfetched. Among these is the offi-

cial position that fields of maize would obstruct the view of drivers and cause accidents.

INFORMATION SOURCES

While much of Prof Maxwell's work is original research, he emphasizes that there is a good deal of information to be mined from existing surveys. For example, he points out that international agencies such as the Red Cross, UNICEF, and the Save The Children Fund, among others, have conducted nutritional surveys in the last decade to determine whether there has been a need for food assistance. From this data, researchers can determine past nutritional patterns and relate these to the level of activity in urban farming and the availability of land.

CHANGES IN URBAN AGRICULTURE

Since he started studying urban agriculture in Kampala, Prof Maxwell has noticed a softening of attitudes on the part of government leaders. "In 1988, I was simply told that urban agriculture was against the law. Officials would not grant any interviews about illegal activity. But now, people are receiving delegations warmly. It's surprising to see planners and politicians now willing to talk and listen."

Marilyn Lee in Toronto



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RECOGNIZING ETHIOPIA'S URBAN FARMERS

Rapid urbanization in Ethiopia from the mid-1970s to the mid-1980s, coupled with drought, famine, and war, placed enormous pressure on the country's food supply, including that of the capital, Addis Ababa, according to an Ethiopian agricultural researcher. But urban residents could do more to feed themselves if authorities would warm to the practice of growing food in the city, says Dr Axumite G/Egziabher.

Dr Axumite has been studying the impact of urban agriculture in the capital for several years and has concluded that the practice is beneficial for the people and for the community.

"Producing food in the city isn't new. It's a traditional life-style. Cows, sheep, chickens, maize, and other vegetables are common in the urban environment," she told delegates to the conference of the Canadian Association of African Studies in Toronto last May. "For some families, growing their own food is their only means of survival."

Dr Axumite's research is especially critical to Addis Ababa. The Ethiopian 1984 Population and Housing Census Preliminary Report showed that the capital accounted for 30.2% of the total urban population in the entire country.

Hunger and poverty are serious problems in an urban centre like Addis Ababa, says Dr Axumite. A survey conducted by the Master Plan Project Office in 1984 shows that 60% of all households in the city were in the low income bracket of less than Birr 200 per month (US\$40 in 1984). Among these households, an estimated 56% of the family income was spent on food.

A 1983 survey of 1,352 households showed that only 17% produced their own vegetables, and that the area under cultivation was mostly less than 25 square metres. Among those households not cultivating, the reason given by 90% of them for not farming was lack of access to land.

Dr Axumite sees urban agriculture as both a long-term and short-term solution to the problem of ensuring an adequate supply of food. She says it is also an answer to the need for nutritious food. Ethiopians generally consume few vegetables

because of their high cost and restricted availability. She adds that traditional eating habits favour buying other food-stuffs such as meat.

GOVERNMENT ATTITUDES

Although it would make sense to take advantage of available land for food production, Dr Axumite finds that government attitudes and policies actually discourage the activity. She says the value of urban agriculture has been seriously under-estimated by government officials. Despite its proven benefits to the poor, urban agriculture is still considered a temporary, part-time activity by citizens.

Urban agriculture improves the quality of life on several fronts, according to Dr Axumite. For one, it creates employment. While most of the food that is produced by households is eaten by the family, some have enough left over to sell, which creates income. And because the food is produced near peoples' homes, it markedly reduces the need to transport food to the city, lowering both fuel consumption and damage to roads.

Despite these benefits, Dr Axumite says residents have trouble getting government authorization to use state land, owing largely to bureaucratic indifference. "There's lots of public land: school yards, road-sides, along highways, even parks."

Another problem people face is access to credit. Borrowing start-up money to launch farming activities, or even to buy tools, is a tremendous challenge, says Dr Axumite.

Dr Axumite calls on urban planners and city governments to better respond to the needs of residents in expanding food production. She says that if Addis Ababa City Council were to grant access to vacant land, to hand out tax rebates, or even simply to coordinate the activities of various

governmental and non-governmental agencies such as the Ministry of Agriculture, these actions would be big steps in making urban agriculture viable.

Even in the face of government apathy, Dr Axumite found that some gardens had been in existence for as long as 43 years. And because of this record of survival, she believes that government officials can be convinced that urban agriculture is a good thing. "Right now, the government just tolerates urban agriculture. It really should encourage it, promote it."

Dr Axumite learned that most urban agriculture is carried out by extended families because of the need to share work. In



IDRC: Philip C. Jackson

Families who engage in urban farming spend less income on food and are thus better able to afford higher education for children.



Agricultural cooperatives in Addis Ababa are located along streams in the city, using waterfalls and canals for irrigation. The income of cooperative members has been shown to be 70% higher than people not engaged in urban agriculture.

addition, it allows families to fulfill cultural and social obligations. Family gardens also guarantee the cooperation and assistance of different branches of the family to ensure long-term survival. "It's like insurance," she says. "I help you now, you help me later."

Dr Axumite also found that the collective manner in which families ran their operations meant that those families had more money. They had less need to spend income from their jobs to buy food. About 60% of families who engaged in urban agriculture owned their own homes. The extra money also allowed the families to achieve higher education levels.

SUCCESSSES AND CHALLENGES OF COOPERATIVES

While most urban agriculture is carried out by individual families, there are five agricultural cooperatives in Addis Ababa. Each is along a main river or stream in the city, taking advantage of natural waterfalls and small canals for irrigation to carry out intensive farming. While some of the produce is consumed by members of the cooperatives, most of it is destined for sale.

In the case of the largest cooperative — the Mekanissa, Furi and Saris Vegetable Producers' Cooperative —, Dr Axumite learned that its formation was self-inspired. The members came up with the idea as part of a strategy to become self-sufficient and protect themselves from exploitation by outsiders. Some of the value of this initiative can

be seen in the fact that the income of cooperative members has been shown to be 70% higher than people not engaged in urban agriculture.

A NEW OUTLOOK

Being part of a cooperative also changed the outlook its members had of themselves. As members, they each had equal rights and responsibilities in all the activities of the cooperative. All members had the right to vote, and to be elected themselves. Shares from the cooperative were distributed based on the number of points assigned to each task.

The cooperative created a strong bond among its members. This solidarity has inspired members to solve their own problems. The knowledge and self confidence thereby created has helped the people to become more independent, says Dr Axumite.

But here again, credit becomes an obstacle: because the cooperative has not been legalized by the government, it cannot get loans to improve the productivity of the operation.

LOOKING AHEAD

While Dr Axumite's far-ranging research paper has lifted the curtain on the impact of urban agriculture in Addis Ababa, she says that certain aspects require much more study. While the production of food in urban areas — especially perishable vegetables — will undoubtedly reduce the strain on limited transportation and on energy-intensive processing and packaging, its impact on the economy needs to be fully explored.

She says that scientists also need to examine the impact of urban agriculture on the environment in terms of micro-climate, soil conservation, and disposal of wastes. Finally, Dr Axumite points out that researchers should not overlook the impact urban agriculture has on the socio-economic structure of the communities in which it takes place, given that it represents much more than a temporary phenomenon.

Marilyn Lee in Toronto



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BREAKING NEW GROUND IN DAR ES SALAAM

New research on urban agriculture challenges the conventional view of the practice as a marginal activity of minor significance. In Dar es Salaam, farming is proving to be a positive and widespread activity that crosses socio-economic groups but one whose full potential is unrealized in the absence of favourable government policies.

In a project supported by IDRC, Dr Camillus J. Sawio, an assistant lecturer in geography at the University of Dar es Salaam, is studying the extent and patterns of crop growing and livestock

keeping in the Kinondoni District of Dar es Salaam. His goal has been to learn how much land is available within city limits for farming and to identify the factors that affect urban agriculture.

"Research into urban agriculture is a new phenomenon. There isn't much understanding of how urban agriculture takes place, and what contribution it makes to the economy." What is known, he says, is that feeding people in the cities of the developing world is becoming an urgent problem as more and more people flood into the urban areas.

"The worsening food shortages in Tanzania because of drought, war, and poor agricultural management are well documented."

In addition to field observations, multiple interviews and questionnaires, Dr Sawio is obtaining information through aerial photography. By analyzing historic and current aerial photographs and maps, Dr Sawio is learning how Dar es Salaam has grown and, more importantly, what is happening to open land suitable for agriculture.

Dr Sawio chose to study three adjacent wards within the Kinondoni District: Kinondoni, Msasani, and Mwananyamala. Together, they account for about one-quarter of the total population of the district. He chose these wards because their proximity makes comparisons of land use changes through time an easier task. In addition, Msasani is a well planned ward while the other two have larger

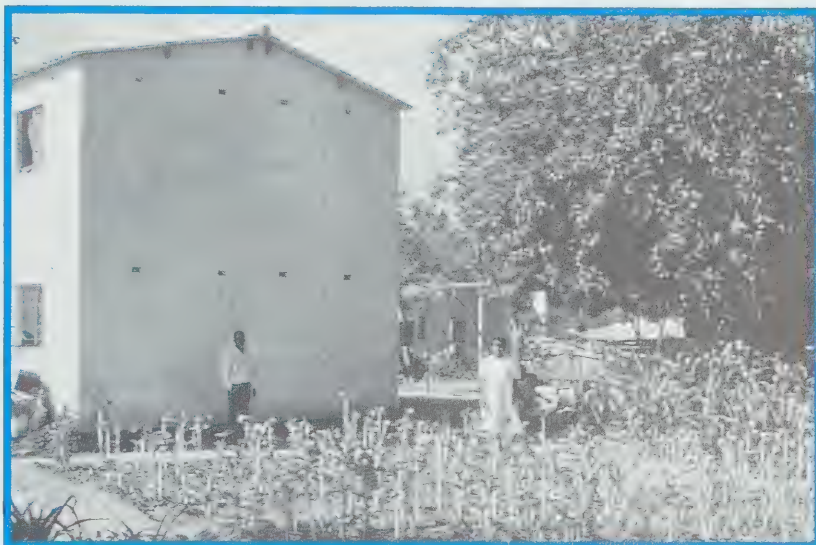


In the foreground grows a plot of amaranth, showing a typical transformation of roadside space in Dar es Salaam into urban vegetable garden.

FARMLAND INSIDE HARARE

The detailed 1989 edition of the Harare street map shows vast tracts of vacant and unbuilt land lying on the doorstep of the central area, east and south of the railroad, in the Mukuvisi floodplain and along tributaries that isolate peripheral districts. The emptiness is striking: within the city centre upper-class quarters on large lots, parks and generous rights-of-way make distances practically unwalkable. Popular pressure on central land for work, shelter and food has become enormous. Nighttime squatting in central parks and on the Mukuvisi margins is on the rise.

The lots around public tenant flats are extensively cultivated. At one lot on Jabavu Street at 77th, the wives of six civil servants garden the large front and side yards in six equal-sized plots. One of the women, Ms. Maziyire, grows rugare — a drought-resistant leafy perennial rich in minerals and vitamins — corn and pumpkin (stunted by drought) to which she applies



IDRC: Luc Mougeot

Ms Maziyire, pictured above in her fenceless streetcorner lot, has lost crops and poultry to thieves, a common problem for urban farmers.

dish water and domestic garbage. Some of her crops and all 24 chickens have fallen prey to thieves on the fenceless streetcorner lot. *Luc Mougeot*

squatter areas, providing an intriguing combination of characteristics.

Among Dr Sawio's major research results are these findings:

- Both men and women take part in urban farming;
- Seventy-two per cent of people engaged in urban agriculture are married, making farming a family activity that includes children;
- While it is often held that urban farmers are mostly recent rural-urban migrants who continue to resort to their agricultural skills in the city for lack of alternatives, the study concurs with other recent research that a substantial minority was born in the city. The majority are well established migrants who also practice a wide range of occupations;
- Urban agriculture is not a marginal activity but an important undertaking since, among other things, it generates income.

Households produce staple foods such as maize and cassava in addition to milk, meat, poultry and dietary supplements such as vegetables. Only a privileged few can make a living solely from a salary in the city; and

- Urban agriculture is not just an activity of the unschooled or illiterate. Although the educational level of urban farmers had been thought to be low, in actual fact new data shows that more than 40% of the people engaged in urban farming are secondary school graduates, business owners, professionals, or doctors.

RECOGNIZING PEOPLE'S INITIATIVE

Dr Sawio has come up with two key recommendations. First, he says the initiative of the people must be looked on favourably. "Policies should be made to create an enabling

environment. People are hurt by the attitude that urban agriculture is not important, that it's a temporary and transient activity that does not have a place in the city."

Dr Sawio also advocates more cooperation among policy makers, planners, and farmers to make the urban environment more livable, productive and environmentally sound. "It may entail linking urban agriculture with the larger urban economy," he says. "This is an opportunity to develop new paradigms."

For example, he says government leaders must consider recycling agricultural waste as fertilizer in cities and take advantage of used water for irrigation. To alleviate the disastrous effects of wind erosion, Dr Sawio suggests planting fruit trees as wind breaks. "Even growing grass to prevent soil erosion can be useful as fodder for animals."



Mary Tarimo, a Dar es Salaam farmer, has had technical advice from agricultural extension officers, who work throughout the city.

NEW FIELDS OF INQUIRY

While Dr Sawio's research has uncovered some new truths, he says it has also opened up more areas of inquiry. "We need to define the concept of urban agriculture better, to differentiate between agriculture in open space in built up areas versus farming in the urban fringe, which in fact includes rural land."

"Urban agriculture comprises several systems, types of farming activities which include crop production, live-stock keeping, aquaculture ... floriculture. We need to document more clearly the various types.

"We need to address linkages between urban agriculture as an informal sector activity and other urban processes such as community action, health, nutrition, gender, education, and the overall issue of poverty." In addition, Dr Sawio points to the lack of attention to linkages between

urban agriculture and natural resources within the city such as water and soil.

"Researchers must also assess the impact of urban agriculture. We must find out the risks and hazards of farming in cities in terms of the environment and urban planning."

Dr Sawio notes that good urban planning must seek the input of residents to find out their lifestyles, culture, needs, and aspirations. He also cautions that city residents who farm must be well informed so that the benefits of urban farming are not lost owing to unwelcome side effects. For instance, he recognizes that if urban farmers fail to use proper methods, disease could spread.

In the current context, Dr Sawio advocates continuing research. He believes his studies have opened a window to really help break poverty in cities. "I want to address poverty

realistically ... poor people in the city are trying to survive." He insists that urban farming can help through providing food and jobs.

The Tanzanian government has shown some interest in encouraging urban agriculture, says Dr Sawio. Knowledge from this and other studies will help planners and policy makers enhance the opportunities for citizens to produce crops inside the city, as well as ensure the preservation of land and other resources.

Marilyn Lee in Toronto



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THE NEGLECTED INDUSTRY OF KENYAN CITIES

A national survey among urban households in Kenya lends weight to researchers around the world who argue that urban agriculture is a vital tool for alleviating poverty and achieving sustainable development in the cities of developing countries.

A rapidly growing "industry," urban agriculture involves millions of Africans, Asians and Latin Americans, who raise fish, tend livestock and grow crops in tanks, ponds and backyards, on roof tops, roadsides, vacant lots, steep slopes and floodplains.

"Urban agriculture is an important coping strategy of the urban poor, many of whom say they would starve if they weren't farming," says Davinder Lamba, director of the Nairobi, Kenya-based Mazingira Institute. "However, policymakers are often blind to this and try to discourage food production in urban areas in the belief that it causes public health and traffic problems."

At an IDRC workshop on urban environmental management held last May, Lamba was one of several researchers to advocate a closer look at urban agriculture. In one presentation, Jac Smit, president of Regional and Community Development Consultants in Washington, D.C., argued that sustainable development is "unthinkable" without urban agriculture, given that more than half the global population will live in urban areas in a few decades.

According to Smit and his co-author, Joe Nasr, "urban agriculture is the most efficient tool available for transforming urban wastes into food and jobs." Its potential benefits include poverty alleviation, better nutrition, a stronger economy, an improved living environment, and savings in energy, land and natural resources. The researchers concluded, however, that urban farming is "a vast opportunity missed ... because little effort has been put into optimizing [its] capacity."

This message was underlined by Davinder Lamba, who presented a paper by two colleagues that summa-



Jac Smit/RCD

The large garden plot (pictured above) is adjacent to a cinema in downtown Nairobi. Urban Kenyans turn to farming to offset the financial difficulties associated with unemployment, rising food and fuel costs, and low wages.

rized the current status of urban agriculture in Kenya as revealed in a national survey by the Mazingira Institute. The first of its kind in Africa, the 1985 survey involved interviews with more than 1,500 households in Nairobi and five other towns.

The survey found that both cultivation and livestock keeping are widespread in Kenyan cities and towns. In 1985, the value of crops grown in urban areas in one season was estimated at US\$4 million, which represents a considerable contribution to national agricultural production. Despite this, government policies seldom address the needs of urban farmers.

LONG HISTORY

Urban agriculture has a long history in Kenya, said Lamba. It began around 1899, when immigrant Indians living in railway towns sold their surplus produce to Europeans. Since then, market gardens have been a consistent feature of the urban landscape. However, over the last 40 years, urban farming has evolved into a primarily subsistence activity, practised by families of all income groups. Today, 77% of

urban farmers grow food entirely for their own use.

The expansion of urban agriculture in Kenya has paralleled both the population growth of urban areas and negative economic growth. Between 1948 and 1989, the proportion of urban dwellers increased from 4.5-14.8% of the population, and is projected to reach 24.7% by the year 2000. But economic prospects for urban migrants are generally dismal.

"Ever since the energy crisis of the 1970s," said Lamba in an interview, "they've seen high unemployment levels, rising food and fuel costs, and depressed wages. In absolute consumption terms, Kenya's cities are composed of very poor people who are driven to find ways to survive."

According to the Mazingira Institute survey, about two out of every three urban households cope by growing their own food and 29% do so in urban areas. Similarly, 51% of families keep livestock and 17% keep urban livestock. In the smaller towns, 100% of families supplement their diets by gathering indigenous vegetables that grow wild.



Jac Smit/RCD

Waste-based roadside agriculture along a ring road sewer in Nairobi.

ACCESS TO URBAN LAND

Urban farming is practised by more than nine out of ten families who actually have access to urban land. Families living in smaller towns tend to have the best access to urban land and very low income families in large cities have the least. "While higher income families tend to farm in backyards, those who don't have backyards farm wherever they can find the land to do it — in valleys, on roadsides, near railtracks and so on," said Lamba.

In Kenya, the majority of urban farmers cannot afford commercial agricultural inputs such as fertilizers. However, 30% use manure and one in four use compost, which they generally obtain either through informal barter or produce themselves. The survey also revealed that 45% of urban farmers water their crops, of whom 71% use piped town water. This rate is higher than the proportion of rural farmers who irrigate, and partly explains why agricultural productivity is higher among subsistence farmers in urban areas as compared to those in rural areas.

Like urban crop production, the value of livestock produced in towns and cities is significant. At the time of the survey, there were an estimated 1.4 million head of livestock — worth about US\$17 million — kept in all of urban Kenya, not counting animals

that died, were eaten or were sold during the year. Chickens and rabbits were the most common livestock. There were also plenty of goats, sheep and cattle, especially in the smaller towns. Most urban farmers let their animals roam freely, except in Nairobi where lower income households keep them penned because of space constraints.

Traditionally, livestock represent wealth and status in the Kenyan economy, but they are primarily a source of protein among the urban poor. Unfortunately, mortality rates of urban livestock are very high. In 1985, more animals died than were used for food. Disease is a principal cause, said Lamba. "Less than a quarter of the urban farmers dip, spray or vaccinate their livestock." Moreover, many animals may be underfed because few households can afford to buy feed.

According to Lamba, the survey suggests that a change of attitude toward urban agriculture by government officials is overdue. In Kenya, everything from agricultural policies to zoning bylaws act as hindrances to urban farmers. Although a few towns, including Isiolo, actively support agricultural activities, in most municipalities crop and livestock extension services, such as irrigation and veterinary care, are simply unavailable.

For would-be urban farmers, the chief constraint is access to land, he added. "Despite the increasing ruralization of Kenyan towns and cities, many Kenyans and their leaders continue to associate cities and modernity ... [and] have sought, in the face of considerable adversity ... to maintain artificially high urban standards inherited from measures designed to protect public health."

For example, the Local Government Act gives every town the power to either permit or restrict urban farming. As a result, cultivation is prohibited on many Nairobi streets and is actively prevented on unused public lands in some other towns, apparently without considering the consequences.

"As law enforcers at the local level," explained Lamba, "if you harass people, impound their sheep and goats, and cut their crops, you might think you're doing the right thing because sheep and goats excrete and create a health hazard."

"But in the absence of providing alternatives such as jobs for the unemployed, you're making a situation go from bad to worse either by design or by accident," he concludes. "In effect, urban farming becomes an ethical issue from a policy standpoint."

John Eberlee in Ottawa



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CHASING AWAY HUNGER IN BOLIVIA

The sun has barely begun to light up the mountain peaks of the Andes, but Teresa has already been waiting for hours in the chilly early morning air. She is not alone.

A dozen women wait with her, hoping that the international organization responsible for distributing food aid will open its doors very soon. The women are Bolivians just like Teresa, plus a few Aymara, Guarani or Quechua Indians. Some of the women are alone, others are accompanied by young girls, who will help them carry the 25 kilos of flour, the sack of powdered milk, oil, rice and canned goods — their rations for the next two months — to a shack on a hillside far from the centre of La Paz.

Teresa is in a hurry today. After picking up her rations, she must go to her job as a domestic in a villa in a rich neighbourhood. Her thoughts turn to when she finally gets home at nightfall. Her day will be far from over: she will still have all her own housework to do. And the following day at dawn, she will board a rickety old bus that will take her to the Peruvian border, where she may find some trinkets to resell in the downtown area over the weekend.

Fortunately, her children help out. Her husband left without leaving a forwarding address. She is lucky also that there is a community garden, where she goes once a week to hoe, weed and water. She earned US\$5.36 this month — nearly one quarter of her total income — from selling the vegetables and flowers from her garden. And there were fresh vegetables (free of cholera bacilli) that her family was able to eat.

Teresa's daily struggle for her own and her family's survival is the fate of millions of Bolivians. In fact, no fewer than two of the six million inhabitants of this landlocked country in the high Andes currently receive international food aid. That's one out of every three Bolivians, who are among the poorest people in the whole of Latin America, with an average annual income of



Food in local markets is too expensive to permit a balanced diet for many urban Bolivians, who settle for cheaper but less nutritious products, or rely on food aid.

some US\$300 per capita, and less than half of that in some areas.

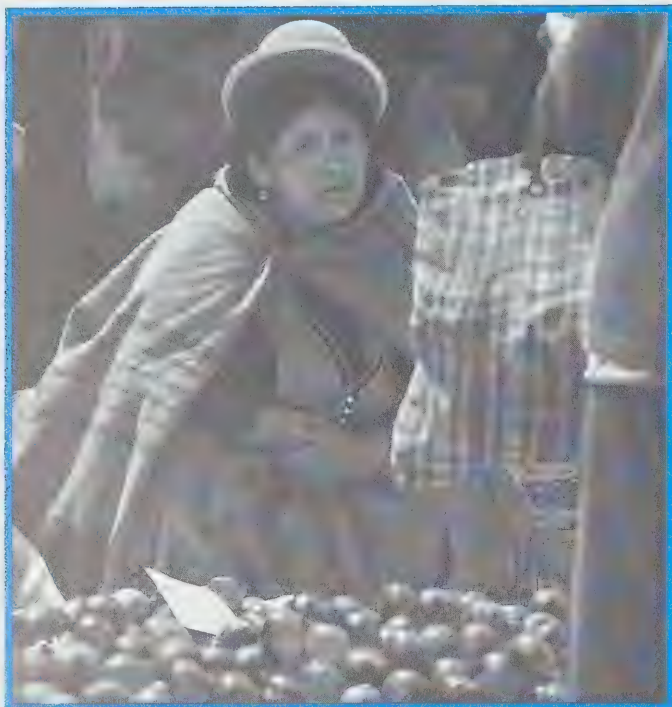
THE STAFF OF LIFE

The one basic necessity for the millions of people living in poverty is to eat. Julio Prudencio Bohrt, an economist with UNITAS (La Union de Instituciones de trabajo y accion social), an umbrella organization of 23 NGOs, recently presented the results of a study on nutrition during a seminar on urban agriculture at the annual meeting of the Canadian Association of African Studies, held in Toronto in May 1993. His study, conducted under IDRC auspices, highlights the reduced nutritional intake of the entire Bolivian population — a result of low incomes, deteriorating North-South terms of trade, and climatic disasters.

"When we compare food consumption in 1958 to that in 1992, we see a gradual decline in calorie and protein intake," explains the researcher. "In 1992, calorie intake was 13.8% lower and that of proteins 24.35% lower, compared to levels in the late 1950s.

Bolivia, however, has many agricultural resources. Some years ago, we produced all the food we needed, but we have been importing more and more food for the past fifteen years or so — a large amount of which is made up of aid. This is a national tragedy, because food aid discourages domestic production." The total amount of food donations stood at 5,614 metric tons in 1974; by 1990, it had risen to 233,474 tons. As a result, the eating habits of the Bolivian people have undergone a radical change.

The results are alarming when applied to the entire population: the average Bolivian is eating fewer types of food — in fact, half the variety of twenty years ago. In 1976, the average food basket contained 67 products, in 1992 only 25. Low-income families have virtually stopped drinking fresh milk — essential for growing children — and eating meat and even fruit; they make do instead with more reasonably priced products that often contain fewer calories and less protein.



Marketing home-grown produce can make an important contribution to the household incomes of Bolivia's poorest city dwellers.

As a result, the underprivileged no longer manage to meet the minimum nutritional standards; this is illustrated by the fact that poor urban families have a calorie and protein shortfall of over 20%. While a high-income urban family consumes an average 2,371 calories per person per day, a low-income family consumes only 1,817. A key statistic is the fact that all the calories consumed by the members of the first family come from bought foods, whereas this proportion drops to 29.6% in poor urban families — with aid accounting for an unbelievable 67% of their total food intake.

INCOME AND FOOD QUALITY

Mr. Bohrt's study also examines the income of each family, the social and professional status of its members, the number and quality of the products consumed each month, their origin, etc. The study established a fascinating causal link between income and food.

The prosperous family spends only 27% of its income on food. On average, 80% of their daily calories comes from six products (bread, pasta, milk, cheese, butter and meat), half of which are imported or made from imported goods.

The poor urban family spends two-thirds of its monthly income of US\$119.41 on food and gets nearly nine-tenths of its calories from six products: wheat, rice, sugar, oil,

plantains and potatoes. The family income is made up of the father's, mother's and children's earnings from various jobs in the informal sector of the economy. It is interesting that 3.4% of the family's food is produced by urban farming — a new and increasingly significant activity.

Since rural families have difficulty earning more than US\$30 a month, they are the most badly off, spending three-quarters of their income on food. Potatoes, chuno (dried potato), rice, beans and sugar provide 95% of their calories; 40% of these come from food aid. Nearly all the children work. Although adults at rest burn approximately 1,500 calories a day merely to maintain their metabolism, each member of these rural families consumes only 1,598 calories and 47.4g of protein, derived primarily from home-grown potatoes and donated rice.

URBAN FARMING

The study also highlights the new role played by urban farming, both for its calorie contribution and the income it generates. For several years now, especially because of the cholera epidemic, La Paz supermarkets have sold lettuces and fresh vegetables grown in community gardens and solar greenhouses either in the city or on the outskirts; this guarantees the quality of the products. As a safety measure, many well-off families buy only vegetables grown this way. Urban farming is primarily women's work — sometimes widows or women whose husbands have left them and who are courageously struggling to provide their children with the basic essentials: a survival strategy like any other in this country with a chronic — and growing — food shortage. It is an unrecognized daily achievement: an exhausting obstacle course run every morning by countless valiant Teresas.

André Lachance



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SPACE FOR BICYCLES IN THE CHINESE CITY

Keeping bicycles on the streets even when economic growth puts new pressures on city roadways is the aim of a collaborative project between Canadian and Chinese urban transport specialists.

The project team is headed by Prof Xu Xun Chu, an expert on bicycle transportation from Tongji University in Shanghai, and Dr Walter Jamieson of the University of Calgary, Director of the Centre for Livable Communities. The team, financed by IDRC, examined transportation needs and the role of bicycles in Ningbo, an industrial

port city of about five million people, located south of Shanghai.

In 1984, the Chinese central government designated Ningbo as one of 14 coastal cities opened to the outside world. Growth in economic activity boosted peoples' incomes. Bicycle sales rose to the point where there is nearly one bicycle per adult.

The motorized vehicle fleet also swelled, creating havoc on roads already full of bicycles. The higher traffic volume produced more accidents and grid-lock; some of the roads in Ningbo are only six feet wide. Despite the importance of bicycles in Chinese society, urban planners were increasingly designing roads and interchanges without bicycles in mind.

Prof Xu became concerned with the westernization of transportation — seen in technology, planning methods, and more cars and trucks. The bicycle was quickly disappearing from the planning process even as the number of bicycles was increasing. According to Dr Jamieson, "It wasn't as if less people were using bicycles. The quest for modernization meant bicycles were not being considered in the planning process."

Bicycles were being neglected just when countries such as Germany, Holland, and even Canada were successfully introducing them as an alternative means of transportation that is cost-effective and decreases traffic congestion and pollution.



Economic growth in cities such as Ningbo has been accompanied by more motorized vehicles and more bicycles competing for the same street space.

REPORTS

In Ningbo's case, the researchers wanted to change the attitude of Chinese urban planners and prove that by preserving a place for the bicycle in urban transportation, the Chinese will create an efficient, cost-effective, and environmentally friendly system.

The team of Chinese and Canadians made the case that bicycles are a leading edge technology that should not be abandoned. The researchers also wanted to show that by modernizing bicycle design, altering the infrastructure, and stressing the need for good traffic laws, bicycles and motorized vehicles can coexist.

The average bicycle in China uses 50-year old technology, according to Dr Jamieson. "Many bicycles don't have gears. By putting gears on them you increase efficiency and make them easier to use by certain segments of the population. Gearing also reduces the length of bicycle overpasses. The gradient can be steeper with gears." Bicycle lanes on new roads also help.

The project emphasized the importance of good traffic laws and rider education to reduce "bike jams" and accidents. The team examined bicyclists' behaviour with a view to increasing attention to traffic laws, so that riders might stop at a red light rather than breezing through — the current practice for the most part. This attention to rider behaviour is inexpensive and does not require any significant physical changes.

The researchers used video to better evaluate both the quantity of vehicles and the behaviour of drivers and pedestrians. The Canadian researchers also brought geographic information systems (GIS) into the project to supplement decade-old, hand-drawn maps of Ningbo's streets. GIS will allow the planners to update and monitor changing urban transportation trends more easily as Chinese cities continue to undergo rapid change.

Peter Newton



IDRC: François Bélisle

Educating cyclists about traffic law is an inexpensive way to reduce accidents and slowdowns at intersections.



IDRC: François Bélisle

The Ningbo project is meant to show that bicycles are vital elements in an efficient, cost-effective and sustainable transportation system.



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LOCAL COLOUR IN A TRADITIONAL PLANT

The practice of using plants to dye leather, calabashes, baskets and straw hats is centuries old. A team from the University of Ouagadougou has catalogued no fewer than 200 plants used in tanning and dyeing that grow in Burkina Faso. The potential of one of them, red sorghum, has stirred considerable interest.

In Burkina Faso and neighbouring countries as far afield as the Maghreb, it is no secret that shoemakers and other artisans use red sorghum. Traditionally the plant is grown around huts and the edges of fields as a windbreak for food crops, and its use has been passed down from generation to generation. Western scientists were aware of its existence as early as the turn of the century. Auguste Chevalier, a French scientist, wrote in 1924 in *la Revue de botanique appliquée et d'agriculture coloniale*, "[...] Throughout West Africa and into the heart of Africa, the Blacks

grow a type of sorghum whose seeds are considered inedible — they are even said to be poisonous — and which is used solely by dyers. I came across this sorghum in 1899 during my botanical exploration of the Sudan. [...] If the industrial use of this dye ever became widespread, there would undoubtedly be advantage in growing Dielicanion (the Bambara word for cherry millet) on a much larger scale in French Sudan and exporting to Europe the raw material used by Sudanese dyers and shoemakers."

Although this idea was expressed over 70 years ago, it has been one of the forces motivating Professor Mouhoussine Nacro, head of the Organic Chemistry Laboratory at Ouagadougou University, who has been studying the tanning and dyeing properties of *sorghum caudatum* — red sorghum — with his team since 1989.

A KEY CONCERN: LOCAL DEVELOPMENT

"Interest exists not only in marketing the product internationally," emphasizes Professor Nacro, "but also, and more importantly, in the possibility of

developing a local product here at home, encouraging the entrepreneurial spirit in Burkina Faso and possibly making the work of the local people who use sorghum to dye their products easier." Professor Nacro's research project, funded by IDRC, is, moreover, part of Burkina Faso's five-year plan, one objective of which is to encourage the production and use of local products.

The pigment (similar to the red in grape skins or in red maple leaves) in red sorghum was identified during phase I of the project. It is an anthocyanic compound, particularly rich in apigenidin, a dye used in the food industry (the sample of pure apigenidin, a synthetic version, used as a marker by the Burkinan researchers came from the laboratories of the giant Coca-Cola company in Atlanta, USA).

Apigenidin belongs to the family of anthocyanins, which are responsible for a wide variety of colours in plants and are increasingly sought after by the dyeing industry. Products derived from coal tar, which has given rise to concerns on medical grounds, are increasingly being abandoned in favour of natural dyes, especially ones of plant origin, primarily because of their great stability in an acid medium. The anthocyanic compound of red sorghum is extracted from the plant's leaf sheath. It makes up over 20% of its dry weight, which is remarkable when we consider that the most common source of this type of dye, the skin of the red grape, contains no more than 5%.

Interest in red sorghum thus appears eminently justified, especially since it is the only known plant to contain large concentrations of such substances.

TRADITION AND MODERN SCIENCE

Traditionally, the dye is extracted from sorghum by cottage industries using time-consuming, primitive methods that are not conducive to mass production or to creating a product of consistent quality. Artisanal dyers basically work on a piecework basis, depending on their immediate



Instead of preparing red dye himself, leather worker Abdoulaye Barry would prefer to buy dye powder and turn his energies to crafting leather goods.

needs or those of their customers. For example, to make a red suitcase, the dyer takes some sorghum sheaths that he buys in bundles at the market, crushes them using a mortar and pestle and then adds water, lemon, and vegetable ash, also bought at the market. The dyer uses his eyes and sometimes his tongue to taste the concoction to obtain the desired result. The dye obtained using this method can vary from red to yellow depending on the quantity of lemon added.

The next stage in the dyeing process is to soak the hide in the solution until it is sufficiently impregnated. This process also causes the skin to tan, since the red sorghum extract contains a tannin.

Abdoulaye Barry, a leatherworker in Ouagadougou who has been involved in Professor Nacro's research from the outset, confesses that he wastes time and energy making his red dye (and a black one, which he also produces using artisanal methods). "If these colours were available at the market, already prepared like the blue and the green are, I would buy them willingly," he says. "I could then devote more time to making bags, wallets and other items."

Université de Ouagadougou



Red sorghum contains large concentrations of apigenidin, a natural dye increasingly used by food industries.

The research conducted by Nacro's team has resulted in the laboratory development of a dye-extraction process using simple techniques: the sorghum sheaths are mechanically crushed into fine particles; a solvent is then added in an acid medium (a basic medium gives similar results), produc-

ing a red dye. The mixture is put into a centrifuge, thereby enabling the pure pigment and the product that acted as the reagent to be collected separately. The end product is a fine, burgundy-red powder, ready for use as a dye.

Sorghum's International Following

The team from Ouagadougou University is not the first to be interested in the dyeing properties of sorghum. Since the turn of the century, various varieties of the plant have been studied, as the 1924 writings of Professor Auguste Chevalier attest. Professor Dalziel also referred to it in his 1937 work, *Useful Plants of West Africa*. Several other studies have been conducted since then, notably in 1978 by R.K. Gupta and E. Haslam ("Plant proanthocyanidins. Part 5. Sorghums polyphenols," *J. Chem. Soc. Perkin I*: 892-896), by D.H. Hahn, L.W. Rooney and C.F. Earp in 1984 ("Tannins and phenols of sorghum," *Cereals World Food* 29: 776-779) and by W.K. Nip and E.E. Burns in 1969 ("Pigment characterisation in grain sorghum. I. Red varieties," *Cereal Chem.* 46: 490-495), to name but a few. The Japanese researchers Tomita and Kimura were also interested in the plant; their method for extracting the sorghum dye contained in the seed coat was approved in Japan in 1982 (patent 57-205452). The French researchers, J.-P. Rey,

J.-L. Pousset, J. Lévesque, and P. Wanty from Cameroon recently used this extraction process, which resembles that used by the Ouagadougou team. This team from the University of Poitiers and a company in Douala conducted research similar to that of Nacro and his colleagues in Ouagadougou. Although they worked with another variety of sorghum, *Sorghum bicolor* (L.) Moench subsp. *americanum caudatum*, from northern Côte d'Ivoire, and used the stem of the plant rather than the leaf sheath, the researchers obtained similar results, noting a dry concentration of approximately 30% pigment.

Although methods, as well as the products and equipment used, obviously varied from one laboratory to the other, the conclusions were basically the same: the extraction procedure is simple; it can easily be reproduced on an industrial scale; and commercial production of such a dye would result in the development of a product that is widespread throughout the developing world, especially Africa.



The new dye extraction process replaces the laborious cottage method with simple laboratory techniques, producing a fine red powder ready for use.

THERE'S A MARKET OUT THERE

Phase II of the project focuses on follow-up to research at Ouagadougou University's chemistry laboratory, namely the setting up of a pilot unit to produce pigment using two extraction methods. The pilot unit will be capable of extracting pure apigenidin to provide the international food industry with a superior quality product. A less pure product, containing 50% to 60% apigenidin, would meet the needs of small companies and local artisans. Management of the pilot unit will eventually be turned over to a local entrepreneur in line with the project's local and regional development objectives. The rate of return of producing dye from red sorghum commercially was calculated at 15%, based on the costs and results observed in the laboratory. A higher profit margin is expected if the product is produced on a larger scale. In other respects, however, the results depend primarily on market surveys and marketing strategies that will be used to promote the product on local, regional and international markets.

As far as international markets are concerned, a market survey needs to be conducted in Europe and North

America. Pure apigenidin could be marketed with the assistance of Simon Fraser University in British Columbia, Canada, which is paired with the Ouagadougou team on this project.

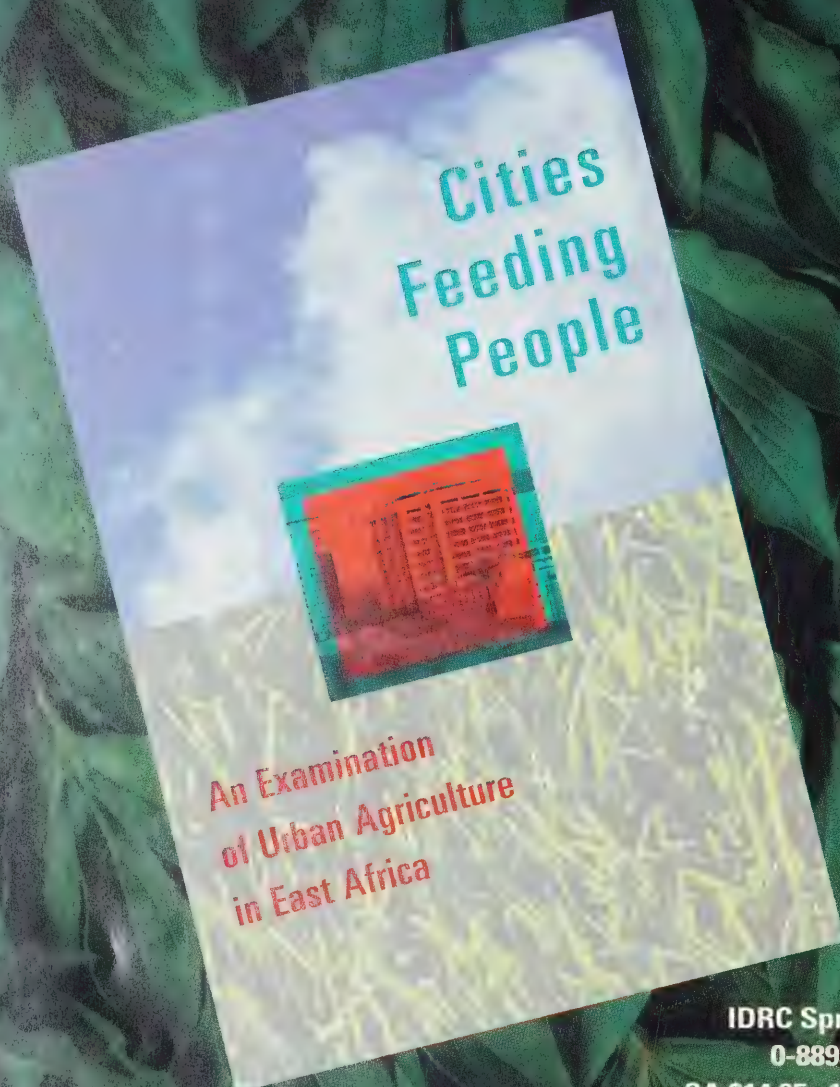
On the regional and local level, the Ouagadougou team is already in contact with various potential customers, primarily a small facility manufacturing salt licks for cattle set up by the Dutch development agency. The company has encountered sales problems because its salt licks are white; the local people, accustomed to red salt licks, are reluctant to accept them. Attempts have been made to dye them, and the results, which are conclusive to date, lead researchers to believe that an unexpected outlet exists for red sorghum dye. Mouhoussine Nacro's laboratory has also been approached by an African manufacturer of fibre cement tiles, complaining about the high cost of the imported red dye he uses. A traditional cottage-industry market already exists in leatherwork, shoemaking and basketwork. The project will provide users with a stable, ready-to-use product of consistent quality.

Michel Bellemare, Ouagadougou, Burkina Faso



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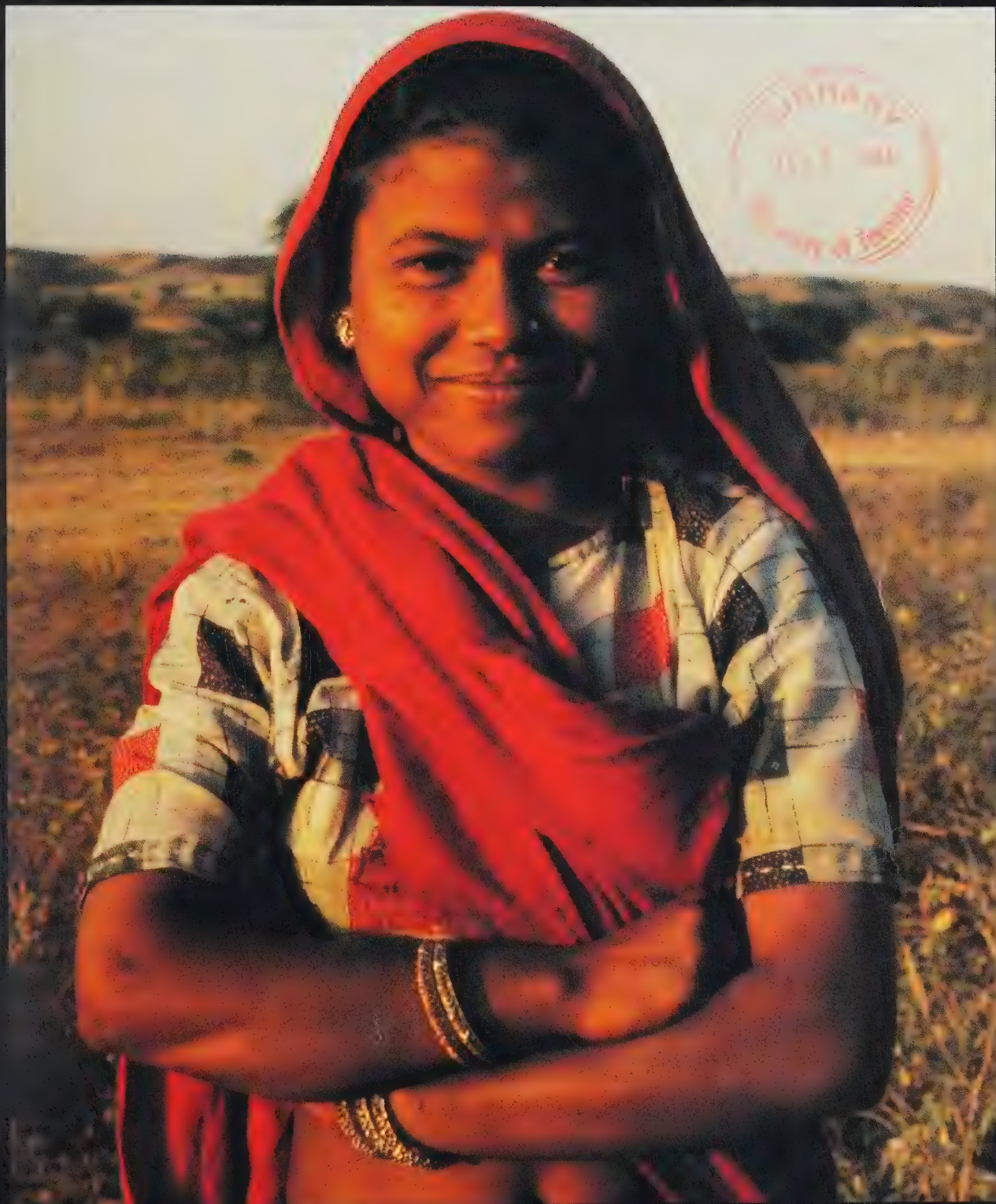
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FOCUS

The critical importance of social policy for human development became painfully clear during the 1980s: pressure to meet massive debt service obligations, coupled with an emphasis on short-term macro-economics, diverted many debtor governments away from the goal of investing in human development.

The impact of economic restructuring was widespread human misery borne especially by women, children and other vulnerable groups in most countries in Africa and Latin America, and in several Asian countries. Today, economic disparity is greater than ever. Over one billion people (one-fifth of the world population) lack adequate food, clean water, elementary education and basic health care.

Governments and research organizations are now awakening to the realization that a degraded social policy environment is detrimental not just to human beings but to economic development, environmental integrity and global security.

As Daniel A. Morales-Gómez states in his overview article, the challenge is to create a new ethical basis to development agendas that places human participation and needs first. Undoubtedly, this challenge will be uppermost in the minds of the planners and participants of the 1995 World Summit for Social Development to be held in Copenhagen.

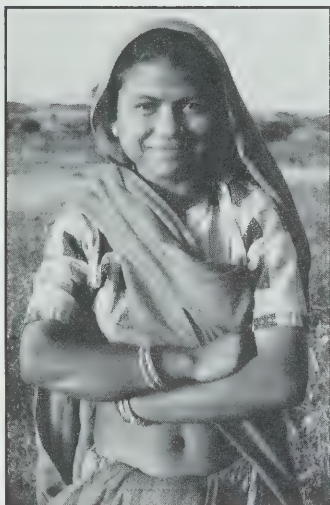
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REPORTS

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IDRC: Stephanie Colvey



India. Empowering women and disadvantaged groups is one important goal of social policy.

Social policy: responding to people's needs

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In the 1980s, development guided by economic adjustment left much of humanity in miserable living conditions, making clear the urgency of a new ethic based on social priorities. *Daniel A. Morales-Gómez*

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RESPONDING TO THE NEEDS OF PEOPLE

As the international community formulates goals and strategies for the 1990s, social policy reform based on human development is gaining widespread acceptance, an alternative to the economic adjustment policies that dominated the 1980s. Persistent poverty, the weak ethical base of a market philosophy of growth, altered roles of key development agents, and less international aid all highlight the urgency of changing how rich and poor countries meet social and human development needs.

Governments in developed and developing countries, it is argued, can no longer justify social policies based on an economic rationale that excludes much of the population from the benefits of growth. But a counterargument contends that citizens cannot expect governments to be exclusively responsible for their welfare at a time of shrinking resources.

The world has reached a point where past practices in the social arena must be revisited. It will not be enough to recognize that social responsibility must be shared differently to find a new balance between affordability, growing needs and basic social justice. Poverty and its long-term impact demand radically different ways of looking at how decisions affecting social development are made and implemented, and who participates in decision making.

Today, close to 3.9 billion people live in conditions of extreme human suffering. Seventy-three percent of humanity does not benefit fully from minimum conditions of human welfare in terms of life expectancy, food, clean water, infant care, basic education and literacy, and participatory and democratic governance.

The potential impact of these unmet social demands is far-reaching. Social integration, national and international security, environmental integrity, and the capacity to share the gains of scientific and technological progress are weakened if social development, and the policies required for its implementation, remain secondary to the goals of private capital.

CHANGING THE SOCIAL CONTRACT

The 1980s brought profound changes worldwide, including drastic economic adjustments for most developing countries that contributed to the further disintegration of their precarious social safety nets — traditionally a state responsibility. Governments had to reverse social contracts to manage public resources more efficiently. Internationally, they were expected to help re-establish a global economic equilibrium acceptable to the world powers.

Trimming the social role of government contributed to a view of the welfare state as an historic relic. This notion further diminished government's responsibility for the well-being of society. Decisions in the social arena became the domain of finance ministries. Monetary, financial and fiscal measures were taken to try to strengthen international competitiveness, promote market solutions to social demands,



Development models driven by the market have failed to address issues affecting the poor: a fresh approach to social development is needed.

and reduce or eliminate costly social programs. Historically, these programs had brought the politically disenfranchised one of their few advantages.

The painful lesson of the adjustment decade is that reaching minimum levels of social development is not just a matter of setting the economic parameters right. In most countries, economic solutions to social reform and development have not generated more opportunities for the poor. Nor have they distributed the benefits of growth more efficiently. Rather they have further privatized extraordinary profits and socialized all losses.

Today, economic disparity is greater than ever before. The richest 20% of the world receive more than 150 times the income of the poorest 20%. This fact translates into dramatic figures of poverty both in developed and developing countries.

In developing countries, 1.3 billion people live in absolute poverty; 17 million people die from diseases preventable with basic health services. Eight hundred million people receive too little food although enough is produced worldwide. Over 35 million live as refugees or internally displaced persons and 850 million live in areas affected by

desertification. Two thirds of women remain illiterate and 34,000 children die daily from malnutrition.

Industrialized countries also face a crisis in social equity, with over 100 million people beneath the poverty line and 30 million unemployed. Even Canada, ranked among the highest in terms of living standards, has over one million children living in poverty; over 2 million people depend on welfare assistance; 1.4 million rely on food banks, and over a quarter million are homeless.

The failure of an economic development logic to address social issues demands a fresh theoretical approach to social development. Representative political systems are a rarity and inequality is engrained in the social structure. Existing development models are unequipped to deal with growing domestic social demands from a new ethical perspective. Most countries need to redefine social objectives and strategies in an integrated rather than sectoral fashion.

All of these factors are obstacles to achieving minimally acceptable standards of equity. A new approach must rely heavily on cross-sectoral planning, target group identification, and needs priority setting. It must emphasize values that determine how society and its institutions can enable various social groups to share in the benefits of development.

SOCIAL POLICIES AND THE GLOBAL SCENARIO

Today's international development agenda is framed by emerging priorities in environment, national and international security, trade relations and competitiveness, and technology development. To address these concerns while improving standards of human, social and economic development, developing countries are expected to act on various fronts. Changes in national and local forms of governance, fiscal and political reform and accountability,

altered public institutional structures, and new ways of setting socio-economic priorities to make better use of resources, are among the expected actions.

The collapse of an East-West divide along ideological lines places in greater relief the gap between development and underdevelopment. Adjustment and globalization have influenced income and wealth distribution through changes in the levels of economic activity and in the relative prices of goods. In practice, these measures have contributed to transferring income from the poor to the rich not only nationally but internationally.

The concentration of power among a few increases with the disintegration of the centrally planned economies. Now that the market reigns virtually supreme as an instrument of social, political and economic equilibrium, the job of finding effective grass-root solutions to social problems is made harder. In this market-driven, interconnected world, developing countries are obliged to improve their international competitiveness, adapt to rapid technological changes, and accommodate their production systems to external rather than domestic demands.

As responsibility for the social well-being of people is transferred from the state to the private sector, the burden of survival falls on the shoulders of the poor and their communities. How feasible are these measures? What are the implications of the choices made by countries trying to balance social and global development objectives? Are there new, effective strategies to introduce countries into the global scenario while maintaining the integrity of their social welfare? These are some of the questions that must be examined.

CHANGING THE ROLE OF SOCIAL POLICY AGENTS

Two phenomena underline the social challenges faced by most developing countries. First, developing countries have not found the development paradigm or model for the twenty-first century. Social, economic, and environmental sustainability are considered to be building blocks for the success of long-term development plans; however, the new social ethics in which these must be based have not yet materialized. Democracy is still elusive, markets are still prisoners of the power of capital, and equity and equality remain abstract notions for the majority.

Second, there is an increasing recognition that past development efforts and their political structures have not fully recognized individual and community needs, cultural values and capabilities as key elements in eliminating poverty. These phenomena lead one to argue that the needs of people should be at the centre of development and that human development must be driven by social rather than economic concerns.

To make this possible, however, it is important to understand the factors reshaping relationships between the state and civil society. For many reasons, countries are witnessing a deterioration in the traditional structures and roles of the state.

Poor management practices, non-participatory decision-making processes, political disintegration and inadequate means for distributing resources are forcing national and



A new development ethic must address education, especially for girls and women — two-thirds of whom remain illiterate in developing countries.

local governments to find new ways of governance. Political mechanisms to implement democracy are perceived as instruments of politicians that do not represent the concerns of the civil society. Many also recognize that in order to effectively implement social reforms over the medium term, the processes of social and economic policy making must be better integrated.

Finding new forms of governance does not necessarily imply reducing the state to a symbolic entity with no social responsibility. Democratization, greater fiscal accountability, decentralization, privatization and local initiative should top the agenda of a reformed state. The citizenry expect the new state to continue to solve key social issues, regulate the behaviour of economic agents, and preserve social justice.

What, then, are the new issues attached to the changing role of national and local governments; what capacities, methods and tools are required to perform such roles; and what are the implications of the fluid social policy environment characterized by the state's retreat from many functions and devolution of authority?

GOING BACK TO THE PEOPLE

The widening gap between rich and poor, nationally and internationally, is another reason to revisit current approaches to dealing with social demands. Wealth accumulation remains a decisive impediment to social justice. The services provided to the poor — especially women, children and marginalized groups — usually cover only a fraction of their needs and fall below minimum standards.

New agents in providing social services — the private sector and NGOs, community and grass-roots groups, and civil associations such as trade unions, credit unions and cooperatives — represent a critical area for further exploration. Social development occurs when local people and communities collaborate to strengthen their bonds and take concerted action to improve their social and economic conditions.

It is time to re-think the policies and methods for providing access to basic services, for monitoring quality, and for identifying target populations. Policy making, the planning and cost-effective delivery of programs, and measuring their impact, are critical areas to address over the short term.

The difficulties developing countries face in fully responding to popular needs for social reform place them in a vicious cycle: the more time needed to bring levels of human development up to minimum standards, the greater is the risk of crippling countries' long-term human capacity to face the future with chances of success.

A SHORT-TERM AGENDA

To make social reform a top priority in the short term, multidisciplinary social research can play a critical role. Analysis should focus on the options for success in a context of new state-civil society relations; on the impact of various international agendas; on internal conflicts eroding an already weakened political consensus around the nation state; and on understanding the real dimensions of the crisis of resources, exacerbated by chronic unequal distribution of wealth.



Social development occurs when communities collaborate on actions to improve their social and economic conditions.

Many questions must be central to a new global development agenda. What are the assumptions in today's understanding of development to which countries will be expected to adapt? What will be the impact of international agendas on the efforts of developing countries to implement social reforms while respecting their own values and cultures? What obstacles will they face in promoting social equality, equity and participation? Are there innovative and successful indigenous attempts at meeting social demands? How can developing countries become more efficient in social policies and programs and still safeguard social justice? And what risks will these countries face if adequate solutions are not found to their urgent social needs?

In the months leading up to the United Nations **World Summit for Social Development**, to be held in Copenhagen in 1995, conditions remain unbearably bleak for much of the world's poor and dispossessed. The current context makes remedies difficult to identify and implement for developing countries. However, well-targeted research, community involvement, political commitment and informed leadership can make vital contributions to creating effective social policy and programs that are appropriate to the needs and values of people in the developing world.

Daniel A. Morales-Gómez is Director of IDRC's Social Policy Program



SOCIAL RECONSTRUCTION: TRADING RIFLES FOR PLOUGHSHARES

Countries emerging from years of conflict, violence, and senseless destruction face a daunting task. These societies must literally trade their AK-47 rifles for ploughshares. They must quickly transform the instruments and culture of war into agents of reconciliation, reconstruction and development.

Moving from destruction and despair to order and hope is a task that countries such as Cambodia, El Salvador, Ethiopia, Mozambique, and Sri Lanka face today. Lebanon, Uganda and Vietnam have been grappling with the challenge for some years while Angola, the Occupied Palestinian Territories, and South Africa have hardly started to address the problem. For far too many developing countries, development must start with building a new social and political order as the base for effective social policies and programs.

NO ROADMAPS

Unfortunately, there are few useful roadmaps to social reconstruction. Countries begin the journey with little generalized experience to draw upon, exhausted physical and human resources, and, perhaps most difficult of all, a shaky consensus over the shape of the future.

The range of problems can appear overwhelming. Mozambique, for instance, has suffered ruthless violence and destruction over the past decade. Over four million of its 16 million people are internally displaced, one and a half million are refugees in neighbouring countries, and over one million Mozambicans are dead. Much of the population is highly vulnerable — widows, orphans, elderly people and the war disabled. Complicating matters are the many ex-combatants who represent an entire generation bred largely on violence.

Urban centres have expanded but without the infrastructure to support migrants fleeing the conflict zones. HIV infection and AIDS have spread unchecked while diseases that were



CIDA, Peter Bennett

El Salvador: A generation raised on war must be turned toward productive civilian activities.

under control have re-emerged with a vengeance. Mozambique is now one of the world's poorest countries, with an estimated per capita GNP of a meagre US\$80 in 1993.

In such a situation questions outnumber answers and everything calls for urgent attention. The difficulties are confounded when intolerance and violence have displaced internal mechanisms of political accommodation and social order. Rebuilding the social and political community must proceed alongside the job of repairing shattered infrastructure.

Restoring people's confidence in state institutions is perhaps a critical first step in social reconstruction. The acceptance of the rule of law and the establishment of political order are key steps in this process. It is necessary to redefine the role of the state, local authorities, civil institutions, grassroots organizations and the private sector. Establishing representative institutions that respond to the needs of the people, as well as serving reconstruction, is problematic in these situa-

tions, but it is a necessary condition for change.

To be meaningful and acceptable, the reconstruction process must be guided by an accurate reading of prevailing realities without becoming a prisoner of current circumstances. Solutions can neither be superimposed nor imported. They must be negotiated by the key social actors, including the hitherto warring factions. The knowledge, structures, policies and actions that emerge from this highly interactive and pluralistic process will become the guiding principles for social reconstruction and development.

Transforming conflict-oriented institutions and channelling their resources into political and social reconstruction present another set of challenges. Resettling refugees and displaced persons, turning former military personnel toward productive civilian activities, and designing national policies that transcend sectarian interests are difficult tasks indeed. How can people who were bent on making war be reoriented to producing food, rebuilding schools, health centres and roads, and restoring faith in the future? The answer lies in galvanizing the inherent capabilities of communities to rebuild after adversity. However devastated individuals and communities may be, they still contain within themselves seeds of regeneration. They are not hapless victims but active agents of their own rejuvenation.

A profound challenge of social reconstruction is the opportunity to develop policies to reduce serious social inequalities. Some of these inequalities — whether ethnic, racial, regional, religious or class-based — no doubt shared in fueling the conflict in the first place. Social reconstruction must stand up to these inequalities or risk building a new order upon historical grievances. Acceptance of diversity and pluralism are central to designing policies and institutions oriented to the rehabilitation and reconstruction of society.

Increasingly, international actors, including the United Nations, donor agencies, development NGOs and

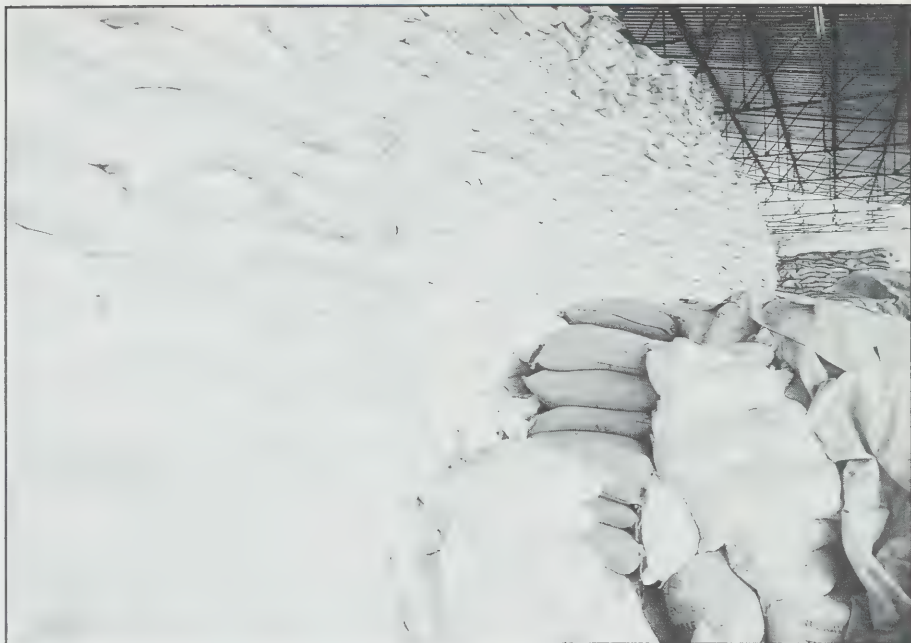
humanitarian groups play important roles in peace-making, peace-keeping and rehabilitating war-torn societies. Their special responsibility is to avoid distorting reconstruction and long-term development. External actors risk dominating the emerging social agenda in the very act of offering help. To be effective and sustainable over the long haul, external assistance should aim specifically at enabling war-torn societies to emerge from disabilities and poverty, rather than trapping them in relations of food aid, indebtedness and general dependency on the international community.

External agents can play a critical role by supporting the research and strategic planning that is vital to policy making at the local, national and international levels. Such initiatives can begin even while a country is engaged in conflict. It is now widely recognized that there are no instant blueprints for social reconstruction. Yet the lessons learned in Afghanistan, Cambodia and Uganda need not be forgotten nor dismissed as inappropriate for the reconstruction of Somalia, Angola or Bosnia. Indeed, there is much to be done in laying the knowledge base for hastening the transition to peace along constructive lines.

Paradoxically, some of the most advanced research and development is often undertaken to prepare for war while planning for social reconstruction is typically put on hold until the guns fall silent. The international community has slowly come to understand how essential it is to prepare for peace. Recently, the heavy costs of the United Nations Transitional Authority in Cambodia (UNTAC) and the United Nations Operation in Somalia (UNOSOM) have underscored the urgency of thinking about reconstruction long before a conflict ends.

Policy and action-oriented research have a vital role in exposing the roots of the conflict, in monitoring its course, in gathering basic data for intelligent decision making, and in creating long-term and appropriate strategies, policies and programs that draw upon painful experiences elsewhere.

Already, an emerging research agenda recognizes that the international community must shift its focus from disaster relief to prevention and



Food donations are often a vital part of short-term reconstruction efforts, although long-term recovery is stronger without an over-reliance on outside assistance.

preparedness, from peace-keeping to peace-making and from crisis management to sustainable development.

At an April 1993 workshop on the "Challenge of Rebuilding Wartorn Societies" organized by the United Nations Research Institute for Social Development (UNRISD), participants identified several priorities for social science research. These include:

- the impact of the massive return to civilian life of ex-combatants in contexts where land, credit, government services and employment opportunities are scarce;
- strengthening or creating access by vulnerable groups to such essential goods and services as food, shelter and health care;
- identifying the appropriate roles of multilateral and bilateral agencies, the state, NGOs, community institutions, private enterprise and the informal sector in meeting social needs;
- designing long-term strategies for rebuilding the national economy while responding to immediate needs and demands;
- identifying the socio-psychological effects of violence and the break-up of families and commu-

nities with a view to providing special services for individuals and groups; and

- the relationship between foreign agencies, state institutions and local organizations in social reconstruction.

Clearly, the range of issues raised by social reconstruction requires different types of research with varying degrees of promise for immediate application. Rapid appraisal research could furnish answers for project design and delivery to meet urgent needs while longer-term research could shed light on persistent patterns of social organization, conflict and reconstruction.

Any material and intellectual resources committed to research for post-war reconstruction promise much higher yields in peace and development than the massive financial aid that is currently being poured into countries emerging from conflict.

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THINGS NEED NOT FALL APART

Over nine million Africans each year will continue to fall below the poverty line until the year 2000, based on current trends. By the same year, African children will account for nearly 40% of infant deaths in the world.

With structural adjustment programs in place throughout the continent today, social development and social policy have been pushed to the background. Basic services such as health, education, clean water and a sanitary environment are not provided or are priced beyond the reach of populations. Concerns about social policy in a wider human development context are considered unaffordable luxuries.

Yet now more than ever an aggressive, coherent and dynamic social policy framework is a first order priority. It must involve all participants in the social policy arena — states, communities, political parties, local and international NGOs, civil societies, religious bodies, donors and all other interested groups.

A FUTURE FOR SOCIAL POLICY IN AFRICA

Social policy work in Africa presents obvious and tremendous challenges to all stakeholders. The challenges lie in the areas of updating knowledge through research, capacity building, and finding creative and popular entry points for social policy analysis and action.

A systematic analysis of social policy in Africa remains to be done. There is significant scope for recovering knowledge on all dimensions of social policy both as a learning tool and for evaluation purposes. Particularly important are the lessons contained in success stories. Education, health, urban development, housing, family planning, nutrition and household food security have all received tremendous attention, while unemployment and occupational health and welfare could stand greater scrutiny. It is vital to examine why certain initiatives succeeded in order to know what approaches are best in various sectors.



IDRC: Philip C. Jackson

Effective social policy for family health must embrace maternal health, child development and nutrition.

CAPACITY BUILDING

Building a knowledge base calls for the human and institutional capacity to effect such a process. There is a need for expertise in research and evaluation but also in policy formulation and management, technical implementation and extension work. The emphasis should not be on building entirely new human resource structures but on rehabilitating existing ones. Another important element is raising awareness of social policy issues and alerting politicians, policy makers, donors and the general populace to their importance.

INTERVENTION ENTRY-POINTS

Social policy issues are often inter-related and inter-sectoral. Thus, cross-cutting issues rather than broad sectors are potentially more rewarding paths for intervention. Rather than health per se, a focus on *urban poverty* would include housing, community participation, health and sanitation, basic education and participatory urban management. Attending

to *household and family health* could include maternal health, child development, nutrition and household food security, housing and sanitation. Interventions to promote the *welfare of working people* could include social security, unemployment and occupational health. The *welfare of youth and the aged* could address recreation and leisure, ongoing education, health, narcotics and alcoholism, depression, deviance and crime.

Other entry-points could include broad themes such as:

- *democracy and empowerment in the civil society*, which encompasses basic education, human rights and participatory management and development;
- *decentralization of social and public services* embracing issues of decentralization, participation, and education;
- *post-crisis social reconstruction* involving rehabilitation of services, capacity-building for sustainable livelihoods, adult education, family health, the strengthening of social solidarity and cultural integrity; and
- *rural poverty and social change* including integrated rural development, primary health care, strengthening capacity for sustainable livelihoods, primary environmental care and education.

Given the scale of Africa's current problems and the urgency of the tasks of social reconstruction ahead, it is only through a dynamic but integrated and multi-faceted approach that effective and representative interventions will be made.

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A FUTURE FOR SOCIAL POLICY IN ASIA

Despite dramatic economic growth in southeast Asia during the 1980s, poverty and inequalities persist for many inhabitants of the region. Social progress has not kept pace with economic advancement nor are the region's social development prospects as positive as its macro-economic potential.

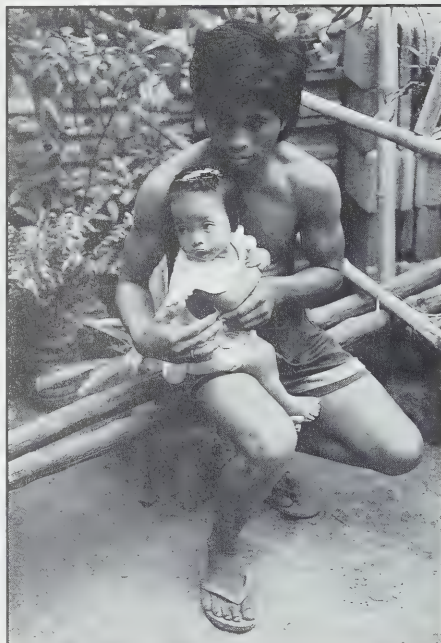
Nonetheless, the field of social policy development is in a healthy state of ferment in the region, according to Dr. Trinidad S. Osteria, director of the Social Development Research Center at De La Salle University in Manila, the Philippines. With IDRC support, she recently reviewed the state of social policy in China, Indonesia, the Philippines, Thailand and Vietnam. Her research results are published in *A Research Framework for Social Policy Development in the Asian Region*.

The development plans of all five countries reflect a growing realization that social policy must be considered an integral part of holistic development strategies. In practice, however, there is still "a gap between policy and program implementation because of resource constraints and the inability to translate goals into viable plans," says Dr. Osteria, a demographer by training.

She also points to other barriers to social development. These include policy makers faced with a lack of social planning skills, the centralization of the planning process itself, an inability of policy planners to represent the needs of the poor, and the low priority given to social services in resource allocation processes.

Many of the region's countries are unable to harness reliable and accurate information for developing social strategies and evaluating their impact on the system. Other obstacles are found in the persistence of unsupported assumptions that economic growth in itself leads to social well-being for entire populations.

Dr. Osteria's research — involving interviews with government officials, policy makers and fellow researchers



IDRC: Claude Dupuis

Uneven economic growth in much of Southeast Asia during the 1980s left many inhabitants behind in terms of social development.

as well as an extensive review of the literature — found similarities in social policy issues among the five countries studied. In most of them, problems of absolute and relative poverty were unresolved by existing programs. The studies also confirmed the centralized nature of planning and administration in the region. Under this system, social policy formulation is based on a central planning agency with the cooperation of relevant ministries. Only in limited cases are local and community bodies part of the process.

In the Philippines, for instance, there is a seeming inability to involve local governments and communities in planning and development of social policies. Central planners tend to design programs and services based on their agency functions rather than on the real needs of the poor. Resource allocation and program identification is done sectorally at the central level, rather than integrating social policy objectives across different sectors.

For Dr. Osteria, linking social policy to outcome — for example, an improvement in the quality of life — depends on equitable access to services and use of these services. "The crux in social policy analysis is the translation of policies into viable and meaningful programs," says Dr. Osteria. These programs should include greater allocation of resources to the poor and a move toward increased decentralization, so that decisions are made closest to those affected.

However, Dr. Osteria recognizes that decentralization poses its own difficulties. Political elites feel threatened by people's participation and some critics portray decentralization merely as the transfer of elitism from central governments to the control of local leaders.

Nonetheless, in a 1992 workshop held in the Philippines to disseminate Dr. Osteria's research results, participants agreed that there is considerable scope for creating an integrated process of social policy formulation involving government, the private sector, recipients and private organizations such as NGOs.

Policy makers also agree on the value of a regional network for research and information exchange to aid in developing more effective social policy planning in the Asian region.

Paul Icamina in the Philippines



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A research framework for social policy development in the Asian region by Trinidad S. Osteria
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LATIN AMERICA'S EMERGING NETWORK ON SOCIAL POLICY

"In absolute numbers and as a percentage of the population ... there is today more poverty in the region than at the beginning of the 1980s."

Inter-American Development Bank, 1993.

The idea for a Latin American Network on Social Policy Research emerged in 1991 from IDRC's Social Policy Program in the region. At that time, the negative impact of the *lost decade* of the 1980s was evident in all social programs and policies. Budget cuts, poor public sector salaries, low quality of social services, and unequal access to services were the chief ingredients of a social crisis that called for rethinking the approach to social policies in the region.

It was clear that a major effort was required to overcome fragmentation of research capacities, the isolation of social policy planning within separate sectors, and the lack of a systemic view about human development problems.

Responding to this challenge led to an IDRC project aimed at determining regional social policy research priorities, a project that formed the nucleus of the still emerging network from the participating institutions. But launching the project and network entailed laying groundwork through regional consultations among researchers, policy makers and practitioners from diverse social policy fields. Three workshops were organized with the collaboration of universities, government departments, and organizations such as the Economic Commission for Latin America, and the Latin American Centre for Demography (CELADE) in Chile.

The initial goals were to inventory institutions within each country capable of conducting social policy research and to identify strategic research, training and information initiatives that could quickly improve the effectiveness of social policies. The strongest research institutions in the area of economics were chosen to lead the project. In today's fiscal climate, social policy proposals must be buttressed by hard evidence of the costs and benefits.

The Social Policy Network began with Argentina, Chile, Colombia, Peru and Uruguay as participant countries. They represent a range of social policy systems, social and economic problems, and development levels. Brazil and Mexico were later added, owing to the characteristics of their social problems, among other factors. Collaborating institutions were selected on the basis of solid relations with public and private sector organizations, and experience and prestige in economic and social policy research.

At the risk of over-simplification, the network has identified the following priorities:

- development of frameworks for social policy-making from an inter-sectoral perspective;
- analysis of the social policy-making processes and participant social actors;
- information systems for the provision of useful and timely data;
- methodologies for monitoring, managing and evaluating social policy and its impact on quality and equity;
- analysis of institutional frameworks with special attention to reform processes, decentralization and privatization;
- evaluation of public social expenditure, cost-effectiveness of programs and mechanisms to obtain accountability; and
- evaluation of training systems and design of alternatives to develop new professional expertise with a multidisciplinary and intersectoral perspective.

By early 1994, institutions from each network country will have produced country reports, the basis of a regional report suggesting future directions for social policy development. A regional seminar in Ottawa in mid-1994 will permit discussion of social policy issues from a Latin American perspective as well as comparing the experience of Canada and other regions. With the first research phase nearly complete, the seminar will also give network members the chance to reflect on the value of further collaboration in a second phase of activities.

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DISPELLING MYTHS ABOUT SOCIAL SERVICE PROVISION

The shantytowns and the poorest rural areas of developing countries stand as stark reminders of the lack of basic shelter, education, health, sanitation, and other services for much of the population.

Yet investments in education, health, housing or other sectors do not in themselves guarantee access to services if other influences on social development are not addressed. Three IDRC-supported projects illustrate the need for a more integrated approach that zeroes in on the critical factors that determine access to services.

HOUSING WITHOUT SECURITY

A global project on evictions shows that access to secure housing depends

on legislation and land-use practices, economic policies, and the ability of citizens to influence decision-making as much as on housing policies. Research in five countries was coordinated by Habitat International Coalition (HIC), a Mexico-based NGO with over 200 members working on shelter issues in more than 50 countries.

Evictions result not only from deliberate policies to eradicate housing, as in slum clearance or urban improvement projects, but also as 'side effects' of other public policies. Moreover, communities without access to policy-making and planning processes tend to be more vulnerable. In the Dominican Republic, researchers found that weak local governments and the absence of ways for people to participate in national decisions rendered

them unable to influence economic and urban policies that affected their access to shelter.

Communities that can organize have greater success in resisting evictions. In South Africa, residents' committees or civic associations used strategies such as boycotts of rent and service charges, and negotiations with land-owners to stop evictions. Support from external agents, primarily NGOs or church-based groups, also played a key role, as in the South Korean case.

Finally, evictions occur where residents lack protection under the legal system, where governments do not recognize rights to housing, or where people's claims to land and housing are not considered legitimate. Tenants, residents of informal settlements and poorer communities were most at risk. In contrast, public awareness of



Public policies in areas such as housing will not work if other influences on social development such as legal protection are left unaddressed.



Fewer public resources and government cutbacks have placed extra burdens on traditional social support systems based in family and community networks.

housing issues and support for tenants' rights and the human right to housing helped discourage evictions in the Canadian case, according to researcher Kris Olds of the University of British Columbia.

COMMUNITY SERVICE PROVIDERS

The African Research Network on Urban Management (ARNUM) is demonstrating that where people do obtain services, particularly in low-income neighbourhoods, it is often the work of communities or "informal" organizations rather than of governments.

In Tanzania, Dr. Mohammed Halfani of the University of Dar es Salaam is using interviews, government records and satellite imagery to investigate informal activity in squatter settlements in three towns. According to Dr. Halfani, housing, services, employment, and security are provided largely outside of formal regulations. For example, some 60% of houses in Tanzania are unregistered, do not conform to building standards, are untaxed, and receive no government services. Dr. Halfani says that by focus-

ing only on the policy process, analyses of urban management fail to capture the nature and dynamics of development, and management systems are at odds with most urban activities.

In Uganda, Professor Arnest Wabwire of Makerere University is conducting research on informal sector organizations such as trade and market associations, savings and credit societies and mutual aid networks. The project investigates the potential for such organizations to improve local administration.

Case studies of selected organizations to examine how they form and operate will "provide a more realistic basis for policies of social change and strategies for the provision of basic needs," according to Professor Wabwire.

EMERGING RESEARCH PRIORITIES

A group of social policy researchers in Eastern and Southern Africa considers it essential to understand the links between economic, social and other policies. As Dr. Stephen Ouma, of Makerere University, points out,

virtually all government actions have implications for social welfare and social policy. The researchers also urge that the role of informal social support networks and NGOs, both important service providers, be studied.

In Africa, recent cuts in government expenditures as a result of economic adjustment programs, exacerbated by crises such as AIDS and political conflict, have placed unprecedented burdens on both government and non-government services.

The work of Henry Manyire of Makerere University indicates that families face increasing difficulty in caring for extended family members, sharing in the costs of school fees or funerals, or rendering other forms of assistance. People's "survival strategies" include urban farming, informal trading, child employment, rotating savings and credit societies and informal health insurance schemes.

Nonetheless, Professor Manyire states, "the traditional forms of extended family corporateness and cooperation are breaking down under economic pressure. Ironically, this is happening at a time when state welfare provisions are being reduced, and poverty is mounting among the population, hence the dire need for the restoration and enhancement of the support roles of traditional systems." Further research would permit a more complete understanding of these systems, the changes they are experiencing and how to support them.

Denise Deby is a Program Officer in IDRC's Social Policy Program.



SHELTER FOR ARGENTINA'S HOMELESS

Urbanization, unreliable tenancy systems and severe economic crisis have contributed to the growing numbers of people unable to rent or buy housing in Argentinean cities. Homeless people began occupying vacant houses and other buildings in downtown Buenos Aires in 1980, and the phenomenon has gradually spread elsewhere in the country.

The homeless come from that large segment of the population that is poor and trying to live in areas offering access to services and employment opportunities. "The day came when tenants could no longer pay the rent, and they were thrown out into the streets," explains Ruben Gazzoli, an architect working with Programa Habitat (PROHA), an organization that supports community housing research and action. "They were forced to occupy buildings, houses, factories, businesses, and any rundown, abandoned place where they could find shelter."

However, when the illegal occupants are discovered, building owners can take legal action against them. After a few months, the occupants are again homeless and forced to find shelter. Under these circumstances, they cannot provide proof of their address — essential for finding work — and fall into an often irreversible downward spiral.

IN SEARCH OF ALTERNATIVES

The PROHA team provides community groups with support in legal and organizational questions, architectural design and construction, and fundraising. Along with supporting the various initiatives of people living in rooming houses and hotels, it tries to push for reforms of legislation governing these submarkets. With support from IDRC, the PROHA team conducts research to paint a clearer picture of the population of rooming houses and hotels, thought to have changed due to the downward movement of an entire social class.

The research also allows PROHA to analyze group problem-solving strategies used by people living in such places, and to identify which ones work best. This combined research and action aims to develop more suitable housing policies and strategies to support changes initiated by the community itself.

HELPING NEIGHBOURHOODS ACHIEVE GOALS

The research results will help grass-roots organizations to play a leading role in the change process. The PROHA team's strategy for involvement is clear: it is not creating a need or selling a service; rather, it is helping neighbourhood groups achieve their own goals. In some cases, this means supporting ambitious groups that undertake projects for ownership by squatting. "They occupy land and then try to obtain legal status by purchasing the land and building homes," says Gazzoli.

In other cases, PROHA helps people devise innovative strategies for organization at the grass-roots. For example, Gazzoli says PROHA worked with residents of rooming houses and hotels, organizing group shopping excursions to the central market. This activity helped people get to know one another and created a network of relationships among the tenants.

PROHA played a part in the first self-managed rooming house, where people living in a hotel got together, formed a cooperative and rented a building. The cooperative dissolved after two years, but Gazzoli points out that participants in the experiment

consider it a success and would do it again given the chance.

CONFIDENCE THROUGH ORGANIZATION

"Above all, we are promoting organization," says Gazzoli. The process of organization helps people living in rooming houses and hotels to come forward and assert their right to housing in urban areas, a task that requires much time and effort, but which is already yielding results. After many years of work, a temporary committee of squatters has been formed. In addition, the municipality of Buenos Aires, which owns most of the occupied houses, has set up a committee to begin negotiations to legalize the ownership of vacant houses.

Negotiations with the local government led to the legal ownership and renovation of the former child welfare agency (PADELAI) building, currently occupied by more than one hundred families: "After a long fight of more than three years, we convinced the municipality to order that the building be recycled and to extend a loan to the community for renovations which would create living space for the tenants and commercial and public space for the neighbourhood. A dual purpose was thus achieved — the people living in the building were given shelter and a contribution was made to improving the neighbourhood."

PROHA's work is part of a long-term project designed to change attitudes that prevent the working class from exercising its right to decent shelter. This means helping the general public to understand the full complexity of

IDRC: Marcela Tapia



The former PADELAI orphanage, now re-occupied, was among the 15% of the building stock in central Buenos Aires that lay vacant.



The PADELAI complex was renovated and its utilities upgraded to house more than 100 families, who also carry out maintenance chores.

the housing problem, and not merely associate it with crime and delinquency. At the structural level, it means a change of attitude with respect to the actual design of the city, and to urban development planning carried out by the government.

THE CITY FROM THE WORKING CLASS PERSPECTIVE

Given the lack of interest shown by some levels of government and the inadequacy of urban planning, PROHA would like to see a committee formed to deal with housing problems in metropolitan Buenos Aires. "The market now controls growth in the metropolitan area," says Gazzoli. "In our opinion, this is an unfair mechanism since it excludes the poor who, because they can't enter the market, must make do as best they can. We feel that a new model should be developed in which the government also has responsibility."

"What type of urban planning do we want?" asks Gazzoli. "We absolutely

must view the city from the working class perspective, not only with respect to the rights of the poor, but also to their role." Since the poor were the city's first settlers, they have a right to live there, says Gazzoli. As well, the city needs them. Viewing the city from a working class perspective means regarding it not as a commodity but as a social project to be built upon, an important notion for urban planners throughout the world.

Marcela Tapia in Argentina



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RECLAIMING THE CENTRAL CITY

The former PADELAI orphanage in downtown Buenos Aires is a shining example of how imagination, dedication and community initiative can help solve inner-city housing shortages. Taken over by homeless families in 1984, this huge orphanage spreads over a three-block area. It has been renovated with overhauled wiring and plumbing, partitioned living quarters, playgrounds, and laundry facilities.

The revamped orphanage is one of 340 abandoned buildings in the San Telmo district of Buenos Aires currently occupied by squatters. Ruben Gazzoli, of the housing organization PROHA, says that about 15% of the building stock in Buenos Aires lies vacant and could shelter up to 600,000 people.

The number of non home-owners is growing in urban Latin America. More and more people cannot afford to live in the distant suburbs, where public transport is increasingly expensive, services are poor, jobs are scarce, and incomes are low.

Throughout Latin America, the challenge is to demonstrate to local authorities why it is good business to preserve an affordable stock of centrally located rental housing as well as promoting other non-ownership housing options. Recycling built-up urban wasteland for those most in need must be part of broader strategies for making cities more efficient, sustainable and equitable.

— Luc Mougeot, Program Officer, Urban Environment Management Program, IDRC.

TURNING AROUND VIETNAMESE AGRICULTURE

Vo-Tong Xuan has devoted his professional life to strengthening what are often weak bonds between scientists and economists, between farmers and politicians, and between different visions of the rural development process.

By thinking locally and acting nationally, the 52-year-old agronomist, who is Vice-Rector at the University of Cantho, helped Vietnam rebuild its agriculture from the ground up. In one decade, the country transformed itself from a chronic rice importer to one of the world's top three exporters.

Xuan's contributions to that turnaround were recognized in September 1993, when he was presented with the Ramon Magsaysay Award for Government Service in a ceremony in Manila. The Magsaysay Award is one of the most prestigious honours in Asia.

The key to Vietnam's agricultural and rice-production success was the introduction in 1981 of an individual contracting scheme to replace the collective farming system set up after the unification of North and South Vietnam in 1975.

The contracting scheme took its starting point from the premise that farmers would produce more if they were given more control of their land and were allowed greater individual decision making. It was a scheme patterned after the highly successful "household responsibility system" launched in China in 1978. Xuan helped adapt the idea to Vietnamese conditions and win support for it among the political leadership.

GIVING FARMERS CONTROL

As a member of the National Assembly (he was first elected in 1980), Xuan worked to convince politicians and government staff that economics, individual freedom, culture and technology were more important than a collectivist ideology in influencing farmer productivity. In the late 1980s, he was among those prodding the government to liberalize food production even further, giving farmers almost



Dr. Vo-Tong Xuan (centre), an IDRC collaborator in Vietnam, recently won the prestigious Magsaysay Award for helping transform the country's agricultural development.

complete control over how and what they farm.

"Ideology is a beautiful thing," Xuan said in an interview in Los Banos, Philippines, where he serves on the Board of Trustees of the International Rice Research Institute (IRRI). "But it is very difficult to implement."

Nothing is particularly easy to implement in a cash-strapped country struggling to rebuild after decades of war and attempting to move to a new market economy. So in order to show that rural farm production could be raised, Xuan had to challenge official practices by running experiments on alternative models. It was risky for him and for the farmers involved, but in the end political leaders could see some of the benefits of the changes that were being tried. "If you're not really dedicated to the cause it is difficult to convince them of anything," he said.

As a scientist and a politician, Xuan has been both dedicated and convincing. His good-natured, common-sense approach to problem solving has made him a popular man not just among the agricultural and intellectual communities, but also among leaders

with purely political or military credentials.

LISTENING TO THE PEOPLE

"I have been very lucky, in that I have had access to the most important policy makers in my country," he said. "But I also very often stay in the houses of farmers — talking with them, drinking tea with them, seeing their thinking. What I have found is that the highest policy makers have the same wish as the farmers." Both want to eliminate rural poverty, according to Xuan.

Xuan said Vietnam's leadership is to be commended for its willingness to listen to the country's specialists in various disciplines. But it is also important that the research scientists listen to the people, he added.

Born to poor parents in the South, Xuan supported reforms to the rural development process throughout his career. He is known to farmers for his appearances on television promoting advanced rice technologies and improved farming methods, and for his work on a radio program dealing with agricultural themes.

IRRI: Ram Cabrera

Breaking Barriers, Building Bridges

As an agronomist and as Vice-Rector of Cantho University in Cantho, Vietnam, Vo-Tong Xuan has sought to coax his fellow scientists into working together to solve broad rural development and social problems.

"We have always had a rice institute, a soils and fertilizer institute, a plant protection institute, a maize institute," he said. Each of these disciplines tends to work separately, according to Xuan. "They compete for budgets, they compete for facilities, sometimes they even nullify each other's results. They don't see each other as components of a whole system."

A "whole system" approach is central to two of IDRC's projects in which Xuan has played a prominent role. The most recent, launched in 1992, builds on Xuan's efforts to win support for farming systems research and extension (FSRE) in Vietnam.

"A farming systems development approach looks at the farmer's enterprise as a multifaceted system that makes use of all the different resources in the community," Xuan explained. Those resources include labour, credit, machinery, crops, soils, chemicals, markets, animals, knowledge, education — all the factors that affect the productivity and

sustainability of an agricultural system. Given the complexity of this system, agricultural researchers need to learn from farmers about their production methods, then help them try to solve any problems through research.

Clearly, understanding such a wide range of components requires interdisciplinary, team-oriented research. Hence the attempts by Xuan and his colleagues to increase communication among researchers in different fields, as well as among researchers in Vietnam and abroad. The project allows a network of seven agricultural universities and two government research institutions to conduct on-farm research and to learn from each other and farmers.

A second IDRC project in Vietnam has benefited from Xuan's involvement. Begun in 1991, it is a collaborative endeavour supported by the International Rice Research Institute (IRRI) to build capacity and to introduce unfamiliar western economic concepts to agricultural economists in universities and government.

IRRI is an autonomous, non-profit agricultural research and training centre whose purpose is to increase food production from rice-based farming systems while pro-

tecting the environment and sustaining resources. It has extensive links with the developing countries of Asia.

An early result of the Vietnam/IRRI project was the founding of the Vietnam Society of Agriculture and Forestry Economists. Their annual meetings provide a valuable forum for policy dialogue and exchange of ideas. "The main idea behind it is quite simple," Xuan said. "When you switch over to a market-oriented economic system, you need people trained in market economics."

The project supported farm survey research and analysis on hundreds of farms in the Mekong and Red River deltas. Other project components included an attempt to evaluate the benefits and costs of alternative production options, the study of various agricultural problems, and support for training graduate students.

The project also enabled the deans of faculties of agriculture, economics, forestry and fisheries in Vietnamese universities to visit the Philippines — for many their first trip abroad — to meet other academics at universities there.

Having completed a doctorate in Japan, Xuan returned home near the end of the Vietnam war to see how he could contribute to his country, especially to building up the university system. He quickly found that his skills were much in demand.

"Most of the technically trained people had left, and all the positions in the country, from the village to the province up to the central government level, were being filled by new people," he said.

"Most were former military or political officers," he added. "What these people had was the commitment to

fight for the country," Xuan said. However, they were less strong in technical ability and unfamiliar with university structures, whereas the academic community had technical ability but was short on political experience, according to Xuan.

Xuan decided there was a good opportunity to act as a bridge between the two groups. "I was thinking, who is going to help my poor people?" he said. "We cannot wait for some saviour from somewhere else."

Jon Miller in the Philippines



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THE PLAGUE RETURNS



Tanzania has lost 5,000 people to the plague over the past ten years. The country has one third of the world's plague cases in its Lushoto District.

An evil that spreads terror, an evil that Heaven, in its wrath, devised to punish Earth for its crimes — the Plague...

(La Fontaine)

A stop at the health clinic has become an unavoidable ritual when travellers from the North head South. Scourges such as malaria, yellow fever, typhus and other endemic diseases tend to strike developing countries, as if they did not have enough socioeconomic problems already. And now, a long-forgotten organism has resurfaced in Madagascar, Tanzania and Vietnam: Yersin's bacillus, more commonly known as the plague.

The plague, infamous in the Middle Ages, now belongs to history; few consider it a threat today. Yet in the past decade it has claimed over 5,000 victims in Tanzania. Even more worrying is the fact that one-third of all plague cases in the world today occur in Tanzania's Lushoto District. And, unfortunately, the one vaccine in use provides immunity in only 46% of cases.

But one man has picked up the gauntlet. We met him at the foot of Mount Kimhandu, in Morogoro, 100 kilometres west of Dar es Salaam. Dr B.S. Kilonzo, a versatile, ingenious educator, psychologist, lobbyist and engineer, hardly fits the image of the ivory tower scientist mixing solutions

in a laboratory. In Tanzania, as in other parts of the Southern hemisphere, few — fortunately — can afford the luxury of specialization. Scientists in the South already have enough hurdles to overcome. AIDS is cutting a deadly swath through the region, there is little money available and indifference is widespread. Communications and roads are in a sad state, while laboratory equipment and skilled labour are scarce, and power blackouts frequent.

Dr Kilonzo directs Sokoine University's Rodent Research Unit, one of only three laboratories in the world specializing in plague research. It took him ten years to convince the country's authorities that the threat of

plague was imminent; he ran up against officials and donors who simply could not believe the disease was a pressing problem — until several plague cases, including one death, were recorded in the capital.

IDRC's Health Sciences Division came to Dr Kilonzo's aid, enabling him to travel to the United States, to the Centers for Disease Control in Fort Collins, Colorado, for training at the plague laboratory. IDRC also helped his team upgrade its capabilities in technical and social science fields.

WAR ON RODENTS

One of Dr Kilonzo's responsibilities is to advise the government on ways of controlling rodents and fleas, the two primary plague vectors. He is trying to determine empirically the extent of the plague bacillus' pool. To find out whether the disease is endemic in a given region, he takes blood samples from rodents, and even domestic cats and dogs. Although only 2% of domestic cats and dogs actually die of the plague, they may harbour the fleas that spread the disease.

Animal vector populations must be reduced, and Dr Kilonzo is devising some highly ingenious ways of achieving this goal. He has come up with a technique that makes rodents kill off their own fleas. Rodents tend to keep to well-defined trails they make through the bush. Poisoned bait is placed on the trails or in boxes with entrances and exits. The poison initially kills the fleas, and the rodent itself succumbs after about three weeks.

Some rodent control methods work well in the laboratory but cannot be used in the field. Villagers are often reluctant to apply suggested methods, thus further complicating the researcher's task. Like people in the Middle Ages, many rural people today believe the plague is God's punishment, or think it is caused by evil spirits or a traditional doctor's curse.

Dr Kilonzo believes that health education is almost always the best place to start, as long as the villagers are willing to listen. But education is not always enough to make people change their behaviour; a villager who understands how and why the plague

spreads may still be unwilling to apply new, sometimes expensive methods. Forced to take a multidisciplinary approach to the plague problem in Tanzania, Dr Kilonzo has made major changes in his laboratory. Where research previously focused only on antibodies and a menagerie of rodents and fleas, the team now has the capability to manipulate the living plague organism in a safe, hermetically sealed environment. Researchers are also showing increasing interest in the sociocultural and environmental factors associated with the epidemic.

A range of parameters is being studied: the impact of seasons, climate, deforestation and massive citrus fruit plantations, the reproductive cycles of plague vectors, and villagers' health-related and cultural behaviour. Specialists in other disciplines routinely participate in Dr Kilonzo's work to broaden the scope of the research. Some puzzling questions nonetheless remain: why, for example, is the epidemic restricted to certain areas, like the magnificent Lushoto District in northeast Tanzania?

EDUCATING THE CHIEFS

At an altitude of 2,500 metres, the lush green hills and reddish soil of Lushoto stand in striking contrast. But the beauty of the countryside cannot hide the extreme poverty of the villagers who live there. Their mud-floored straw huts provide a fertile breeding ground for plague vectors. Most of the work, in Dr Kilonzo's opinion, must be done in the field if his recommendations are to be applied. First, he studies how the villagers live, so that he can devise rodent control methods that involve no major changes in their behaviour. He identifies the village chief and community leaders, explains everything to them and asks their advice — in short, he enlists them as allies from the outset. Subsequently, whenever the researcher and his assistants make their rounds, they are always accompanied by a community leader, who facilitates contact with families and helps obtain their consent to the researchers' sometimes delicate requests: it takes considerable diplomatic skill to ask permission to collect fleas from under the bed!

LOCAL SELF-RELIANCE

Researchers have observed a significant decline in the rodent population, and recorded no cases of plague. But Dr Kilonzo is wary of claiming victory. He knows that the decline could be also due to seasonal factors, and that villagers will be tempted to ease up on their efforts when plague symptoms vanish or when they have to buy the poison themselves. Therein lies the researcher's greatest fear. Rather than creating dependence, his work must help the community become self-reliant. The villagers themselves are the main agents of plague control. In the final analysis, they, not the government, will control the disease. Clearly, educating the people must come before laboratory research.

Philippe Falardeau in Tanzania.



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FARMING FOR FISH IN CHINA

In the warm southern provinces of China, freshwater ponds stocked with up to six different species of carp share a field where crops of grass wave in the breeze and livestock grazes.

For more than 2000 years, cut grasses have fed carp while animal manure treated to kill parasites and bacteria has fertilized the ponds where the fish are raised. The ancient practice is known as integrated fish farming, a type of micro-ecosystem linking water, fish, manure, animals and crops.

Chinese fish farming has much to offer the rest of the world, but its many intricate aspects are somewhat of a mystery. A multidisciplinary research project, supported by IDRC, aims to achieve a scientific understanding of this complex tradition. The research looks at both the biological and technical aspects of fish farming. It includes studies of the physical properties of the fish ponds, the economics of raising fish for market, fish nutrition and genetics, as well as public health and gender issues among the human communities using these systems and living near them.

THE APPEAL OF RECYCLING

The strong appeal of an agricultural technology such as integrated fish farming lies in the promising opportunity for recycling resources within small farms that face intense pressures to produce higher-value crops. De-mystifying the Chinese experience will allow other countries to adapt a "waste not, want not" technology to help their farmers and consumers.

Plumbing the depths of fish farming is a team of Chinese researchers at the Freshwater Fisheries Research Centre in Wuxi, near Shanghai. Two of these researchers, economists Baotong Hu and Hailiang Chen, recently spent six months studying and carrying out research at St. Mary's University in Halifax.

"Although we have been doing integrated fish farming for thousands of years," says Mr. Chen, "we couldn't

quickly expand production in China because we didn't have the comparative research to determine the best method."

Assisting the Chinese team in building their research capacity is Canadian collaborator Dr. Jack Mathias, an aquatic ecologist at Fisheries and Oceans Canada's Freshwater Institute in Winnipeg. His interest in China's integrated fish farming goes back seven years when he began advising Chinese specialists about research design for studying such factors as pond depth, feed, number and types of manurings. Today, Mathias coordinates components of the project involving researchers in Australia, Canada, and China.

A WINDOW FOR THE WORLD

"This project is like a window for the rest of the world to look in and learn from China," says Dr. Mathias. "Very little has been published in English about why integrated fish farming works so well. I see China as a vast storehouse of rich fisheries experience, more developed than Canada or almost any other country in the world, in terms of the management and modification of its aquatic resources."

Fish farmed in ponds accounts for 2 million tonnes or just under 20% of total fish production in China. Carp is both a valuable source of protein for a nation supporting 1.4 billion people and an important source of income as China moves quickly toward a market-driven economy.



Harvesting fish from a pond in Jiangsu Province, China. The ponds account for almost 20% of fish production in the country.

Faced with declining catches offshore, the Chinese government has made boosting production from inland ponds a national priority. Ironically, not much is known about how to achieve this. As a result, the Chinese and Canadian team are now taking the first steps to scientifically analyze and document this successful, traditional technology.

A major component of the effort is a computer-based study of data gathered from a survey of over one thousand integrated fish ponds in eight provinces of China. But limited access in China to computers capable of sophisticated statistical analysis of the survey data kept the data on the shelf until recently. IDRC supplied the computers and supported the participation of Canadian researchers in providing training to complete the bioeconomic study.

HIGHER PRODUCTION AND INCOMES

Hailiang Chen says completing the survey of the thousand fish ponds is an important initial stage toward achieving higher production and incomes for rural Chinese farmers. Fish-farming methods and the presence of equipment like aerators and irrigation pumps vary widely from region to region. The survey results show a strong correlation between high income areas and higher fish production. In provinces where market demand for fish is high and farmers have the money to buy aeration equipment, more fish are harvested.

"What's intriguing about integrated fish farming is its complexity," notes Dr. Tony Charles, a fisheries economist at St. Mary's University in Halifax and a second Canadian collaborator in the project. "I think the conservationist approach of re-using waste makes sense — both environmentally and in cutting down your cost of production. In China, the clippings from the grass crops are used to feed the fish, the animal manure is used to fertilize ponds to grow more fish, and the silt from ponds can then be applied to the fields to boost crop production."

A public health component of the project is studying the controversial



The square fields full of water are integrated fish farming ponds, located alongside the river for the purpose of fresh water exchange.

hypothesis suggesting there could be an environmental link between integrated fish ponds and new strains of human influenza (the Hongkong Flu, for example). The hypothesis has yet to be supported by any proof. With IDRC support, Chinese researchers at the Shanghai Medical University are currently conducting a feasibility study to determine if there are adequate medical records of influenza cases to test the hypothesis.

Dr. John Markham, an IDRC specialist in occupational health, suggests there might be a number of reasons that would account for the rapid appearance of new strains of flu virus, including the fact that China contains one-fifth of the world's people.

WOMEN IN THE FISHERIES

Yet another aspect of investigating integrated fish farming focuses on women. The wife and husband team of Mrs. Yingxue Fang and Mr. Yang Huazhou worked with IDRC's Dr. Yianna Lambrou to complete the first segment of a project that examines the role of women in China's fisheries sector. Mrs. Fang and Mr. Yang are fish scientists who sought the help

of the Shanghai Social Sciences Academy to bring to their research the required multidisciplinary skills.

Detailed responses to workplace questionnaires were received from nearly 1,300 women. An early overview suggests Chinese women lag behind their male counterparts in virtually every area of fisheries endeavour, including wages, education, and managerial positions. Mrs. Fang hopes the research can be expanded to include other areas of China and that "the research findings will provide the policy-makers in the Chinese government with the basis and foundation to make decisions." Another project component will use video to document women on the job at fish-rearing and fish-processing sites, at home, and in research establishments.

The Canadian researchers involved in the project remained fascinated with the intricacies of China's integrated fish ponds. "I think it is important to understand how things *really* work in developing countries," says Dr. Charles. "For example, how information can be collected from farmers, and provided to farmers, in a country as large as China."

"Maybe we in Canada could learn from the Chinese approach. Could we switch from a one-way system — where we dump chemicals in to produce a product and then dump the waste somewhere else — to a recycling system like the Chinese use?"

Jennifer Henderson



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CONSTRUCTING EGYPTIAN ALTERNATIVES

Underneath the steady glare of the relentless Egyptian sun, workers toil on the banks of this country's famed water source, the Nile River. They mould bricks from top soil and Nile silt and then heat them in the smoking kiln, dancing gingerly on the roof to make sure the fruits of their labours are shaped and stored properly.

The workers are engaged in the hectic, competitive trade of making and supplying bricks to Egypt's construction industry.

"These workers and the raw materials they use are the cornerstones of Egyptian small-scale brick production," says Dr. M. Ramez of the General Organization for Housing, Building and Planning Research (GOHBPR) in Egypt, a government research organization. Although labour and Nile silt have traditionally been the cornerstones of brick-making, both have suffered from recent changes and problems within the industry.

The limited availability of prime land around the Nile and the fierce competition over this precious resource forced the Egyptian government to ban the use of agricultural land for brick production in the mid-1980s. When brick companies took the top soil and silt from the land, as they did throughout the 1970s and early 1980s, they rendered it almost useless for agricultural production. The soil degradation and setbacks in agricultural productivity were simply too high a price to pay for allowing brick producers to use the land, the Egyptian government decided.

But the government's ban had human costs as well. Dr. Ramez and fellow researchers estimated that by 1987 about half of the 2,600 small-scale brick plants were shut down owing to a shortage of raw materials. Almost 130,000 people lost their jobs as a result. There were also other effects, such as construction slow-downs that hit the poorer groups in Egyptian society who desperately required low-cost housing.

With the assistance of IDRC, Dr. Ramez has worked towards solving the dilemma facing Egyptian small-scale brick producers through a project called "shale brick production." He and his fellow researchers have concentrated their efforts on alternative, more abundant Egyptian natural resources for brick production. One material, known as shale, has been an increasingly effective substitute for Nile silt.

ABUNDANT ALTERNATIVE

Shale is what geologists refer to as a "semi-consolidated rock" made of fine grained aluminous materials, generally clays. Shale can be found in the desert and along the Nile, where it forms rock outcrops over which it is impossible to farm. The material is abundant — researchers have estimated that there are about 500 million cubic metres of shale in the desert and along the Nile River — but it is less suited to brick-making than the top soil and silt. It still needs further refinement if it is to assist small-scale brick producers in their quest for new raw materials, Dr. Ramez notes.

This straining of demand against natural resources is nothing new in Egypt. In a country with limited arable land and a population that has increased from 16 million people to over 50 million in the past fifty years there is bound to be fierce competition over limited basic resources.

The construction industry has been a classic example. The demand for housing and construction has risen dramatically over the past twenty years. To keep pace, the production of bricks has jumped from 2.7 billion units in 1976 to 5 billion in 1981 to almost 10 billion in 1986.

Farmers with land on the Nile started to rent their land to brick companies in return for quick money. But the implications were serious. Unsustainable exploitation by the brick companies pushed the issue of land availability along the Nile to a head.

When the ban was announced by the government in 1984, some companies ignored it and tried to remove silt and top soil from the land surrounding the Nile in secret, as if it were precious gold. The penalties were stiffened from fines to jail sentences.



The shale brick production project relied on the basic, labour-intensive methods of traditional brick-making.

IDRC: Robert Charbonneau



Using the shale found along the banks of the Nile River, rather than precious top soil, requires mixing it with other materials to produce strong bricks.

Clearly, it was a no-win situation that called out for developing new materials to make bricks.

At this stage, Dr. Ramez and the GOHBPR stepped forward. As early as 1977, Dr. Ramez had succeeded in developing a prototype for brick production using shale as the raw material. He tried to maintain the basic infrastructure of traditional brick-making, realizing that major technological changes would be difficult to introduce. "It was an efficient pilot-scale plant but it closed after two years," he says. "At that time, few were really interested in new techniques of brick production."

It wasn't until the government decree that companies were forced to either try alternative methods of production or face closure. By 1986, when enforcement of the ban was becoming very strict, more than 500 plants modernized and switched to using shale as the raw material for brick production.

"Although this was a positive sign, there were still many setbacks at this stage," Dr. Ramez recalls. Owing to increasing demand, many small-scale plants zealously over-produced without paying attention to the physical limitations of the shale. This resulted in inferior-quality bricks. "If you held up some of these bricks they would

crumble in your hands," Dr. Ramez says. Indeed, the standard measure of brick strength (kilograms per square centimetre) revealed a generally poor quality in most of the bricks of only 10 to 15 kg/cm².

Early in the research, Dr. Ramez and fellow researchers at GOHBPR recognized the physical limitations of shale in brick production. The presence in the shale of a peculiar clay mineral called montmorillonite caused excessive swelling and shrinking when it was made into bricks. In addition, high levels of sodium chloride (salt) in the shale contributed to the cracking of bricks upon drying. The salt also corroded equipment in the brick plants.

OVERCOMING SHALE'S LIMITATIONS

To counteract these problems, researchers have been experimenting in mixing shale with materials such as slag, heated clay, lime and carbonates to reduce the shrinking and cracking of the bricks. An added challenge was to find technology for producing bricks that would be as low cost as traditional methods.

"One thing I realized from the start is that it is very difficult to change traditional production patterns," says Dr. Ramez. "These production patterns in

the brick-making industry are still very labour-intensive and use little technology, often relying on the sun to dry bricks."

So Dr. Ramez and researchers at GOHBPR developed a simple production technique that involved grinding and mixing the shale with other materials, moulding and extruding this into bricks and then drying the bricks until they become hardened. It has been tested at both the GOHBPR site in Cairo and in a pilot plant in Beni Suef, about 60 km south of Cairo.

Dr. Ramez says that many of the small-scale brick producers who have converted over to shale are beginning to take advantage of the project's research results. "We have noted an improvement in the quality of brick that many of these small-scale plants are making," he says. Indeed, the strength of shale bricks has increased from 10-15 kg/cm² to 50-70 kg/cm².

Since 1988, this project has attempted to adapt the production process to environmental circumstances and increase the quality and productivity of small-scale brick plants. "Our immediate objective was to successfully incorporate shale into the brick-making industry," says Dr. Ramez. "But our long-term goal was to ensure the continued viability of small-scale plants for both their employees and the people who relied on them for low-cost housing."

Craig Harris in Egypt



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MANILA TURNS TO RECYCLING

In some developing countries, cumbersome pollution control mechanisms make it impossible to enforce compliance with environmental regulations. This means that hundreds, if not thousands, of pollutants continue to contaminate the water, air and soil of industrial areas in the South, degrading the living conditions of people living around them.

Almost three-quarters of the 15,000 industrial plants in the Philippines are crowded into a single region: Metro Manila. In cooperation with McGill University's Geotechnical Research Centre in Montreal, Canada, the Philippines Ministry of the Environment and Natural Resources has developed an industrial waste exchange system.

INDUSTRIAL RECYCLING

The exchange system, already operating under various guises in Western Europe, North America and Japan, is based on a very simple concept: production waste is actually badly managed raw material, and not really waste as such. Thus, one company's waste could easily be another company's treasure.

With help from IDRC, the Industrial Waste Exchange of the Philippines (IWEP) serves as a link between producers who want to exchange waste. The experiment, a first in Southeast Asia, could be extended to include other countries at a comparable level of industrial development that, like the Philippines, find access to imported raw materials and energy sources difficult.

"The exchange system reduces environmental pollution, recovers usable resources and cuts the cost of waste disposal," said Geotechnical Research Centre scientist Raymond N. Yong. Mr Yong, of Chinese origin from Singapore, was raised in Malaysia and is thoroughly familiar with the countries of Southeast Asia. He is the project's chief architect. "The biggest hurdle was education. We had to make people see waste as raw material, to make

them understand the profit potential there. And we succeeded."

A score of large and medium-sized companies are voluntarily exchanging their waste. They gain by being paid for waste they would not otherwise know what to do with, and by saving considerable sums by acquiring raw materials at bargain basement prices.

Though the environmental impact of such exchanges is still minimal, it is likely to grow substantially in the coming years. Of some 1,200 large companies contacted, 420 expressed a keen interest in the system. Dozens of them are now negotiating reciprocity agreements.

WASTE OFFERED AND SOUGHT

Twice a year, a catalogue is published offering at least 600 industrial waste products of all kinds and listing over 130 more that are sought. Each product is assigned a code to ensure that company identity and location remain confidential, and technical information, such as pH and any contaminants present, is provided. Organic and inorganic chemicals, solvents, oils, greases, waxes, acids, alkalis, metals, metallic sludges, plastics, textiles, leather, rubber, wood, paper and glass — it's all there. What's more, none of them will be dumped into a river, landfill or field.

The system kills two birds with one stone; it protects the environment and creates jobs. To cite but a few examples: calcium carbide sludge, which in the past would have been dumped, is now used as a neutralizer in wastewater treatment plants; waste pulp from a pineapple cannery finds a future as animal feed; gypsum waste is recycled as a component in wall and cement finishes; acid is recycled into batteries.

Not all the waste finds a buyer, but at least the information gets around. When two companies come to an agreement, IWEP withdraws, leaving producers and users to negotiate all agreements directly. Some companies



CIDA: David Barbour

Manila, Philippines. An industrial waste exchange permits industrial zones to pose fewer potential hazards.

are still hesitating, worried about their liability in case of accident. Others are concerned about compatibility and transportation costs. But one thing is certain: IWEP is offering Filipino industries an innovative solution that is economical and profitable on all counts. Everyone benefits: the companies themselves, and the thousands of poor people who have no choice but to live as squatters on the fringes of industrial areas.

André Lachance



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FROM DISABILITY TO OPPORTUNITY

Like many inhabitants of the poorer sections of Manila, Aminta migrated with her large family from the rural countryside of the Philippines to an urban life. Although uneducated and brought up in poverty, she makes a living by working at a cooperative that produces Christmas ornaments and other items for export markets.

The experience of Aminta (a pseudonym) is similar to thousands of others in the slums of Manila. But there is one important difference — Aminta is physically disabled. A hip ailment has made one leg shorter than the other.

Her plight represents the hardships and aspirations of persons with disabilities around the world. For most of her life Aminta has faced the daily obstacles of a person with disabilities: inaccurate employer perceptions about disability, worksite inaccessibility and lack of appropriate transportation. Still she considers herself lucky to have a job in a country where only about 19% of disabled women are employed.

An estimated 500 million people worldwide have visual, hearing, mobility or cognitive impairments. Typically, disabled people are among the poorest of the poor. Statistics show they are most likely to have incomes below the poverty line, be less educated and participate less in society. And their employment opportunities are extremely limited.

These stark facts spurred a project to study various strategies designed to foster economic independence

and employment opportunities among persons with physical and cognitive impairments. The project, supported by IDRC and coordinated by the University of Calgary, identified 76 initiatives in 31 countries in Africa, Asia, the Caribbean and Latin America.

The researchers focused primarily on self-directed employment in developing countries, says project leader and associate professor of rehabilitation studies at the University of Calgary, Aldred Neufeldt. "We wanted to glean from these case studies effective models of income generation and self-employment," he explains. "In essence, we wanted to see what lessons could be learned."

The examples vary considerably. Some projects were designed to help individuals start up self-employment enterprises in the formal or informal

sector, while others encouraged the establishment of worker cooperatives or small- and medium-sized businesses run by people with disabilities.

MODELS FOR SELF-EMPLOYMENT

Indeed, the cooperative to which Aminta belongs in the Philippines represents one of the more successful models for self-employment. Hers is one of 13 cooperatives under an umbrella organization called MicroLink. Funded partially by agencies such as USAID, MicroLink provides training, business consultation, bookkeeping and other services to its member cooperatives. In return, workers at each cooperative agree to set aside any profits for future development. After five years within the MicroLink network, individual cooperatives are encouraged to become independent: two have done so.

"MicroLink shows the importance of having mechanisms in place that enable persons with disabilities to get started," says Neufeldt. "Often, they don't have any formal business training and need some training and advice." The range of products in the MicroLink network has diversified from high-quality Christmas ornaments to calendars and bird cages.

A different type of project in the Philippines promoted the idea of community-based rehabilitation. In the early 1980s, the Philippine government's Department of Social Welfare Development recruited volunteers from neighbourhoods to identify people with disabilities and suggest ways of encouraging them to participate more within the community.

By 1989, the project had expanded to four



Alison L. Albright

Self-employment in developing countries, such as this man's egg production business in Indonesia, allows many disabled persons to enjoy independent lives.

regions of the Philippines and four hundred volunteers had established relationships with approximately 1,500 people with disabilities. Of this number, about 400 found employment, often with a family or local enterprise.

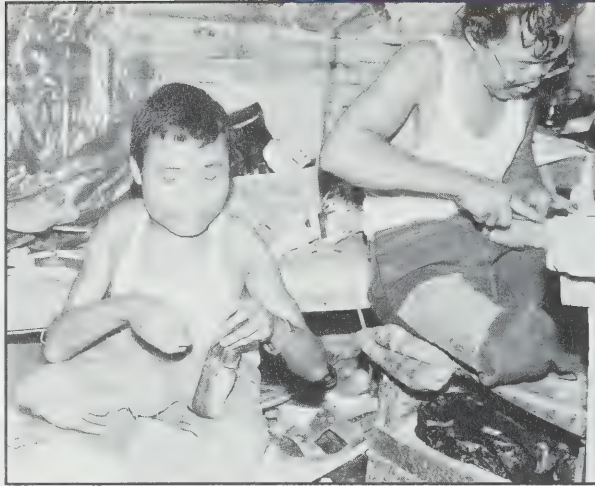
One particularly successful outcome involved a rural woman with significant mobility impairments who wanted to buy a sewing machine. Training and a small loan allowed her to begin a small sewing business. She now employs twelve others. "These kinds of examples are important," Neufeldt says. "Yet the goals of raising awareness and social consciousness about persons with disabilities are equally important in community-based projects."

In a Kenyan project, the main goal was overcoming one of the biggest barriers for persons with disabilities — access to credit. Often, disabled persons have little business experience and no equity, in which case banks will not extend credit nor make loans.

To address this problem, the UNDP, in cooperation with the International Labour Organization, put up a US\$500,000 loan guarantee to give persons with disabilities in Kenya access to credit. The Disabled Persons Loan Scheme provided funding through normal banking channels — Barclay's Bank — for projects that met certain criteria. A viable business plan had to be submitted, along with some proof of business management skills. About 240 people have received loans, complemented by business training.

Other examples of successful employment and income-generating projects involved organizations of persons with disabilities creating and running their own businesses. In Jamaica, for example, DEEDS Industries — producing wooden products for tourism and some furniture — was begun to prove that disabled workers could work alongside those without disabilities and earn competitive wages. Today, 60% of the workers at DEEDS are persons with disabilities who express high levels of job satisfaction.

Alison L. Albright



Successful income generating activities for people with disabilities are determined by skills development, support services, access to credit, and sound management.

Although the models of self-employment and income-generation differ in varying degrees, one thing seems constant about persons with disabilities in developing countries: there is great emphasis on self-employment owing to the absence of wage employment options and the lack of income support from social security programs. It is estimated that for each disabled person employed in the formal sector, at least four are generating income as a result of their own enterprises, mostly in the informal sector.

LESSONS FOR INDUSTRIALIZED COUNTRIES

This situation contrasts sharply with that in industrialized countries such as Canada, where fewer than 3% of persons with disabilities are self-employed. Developed countries have emphasized sheltered workshops and affirmative action programs — but with only limited success. It is estimated that only 50% of disabled people are employed in industrialized countries.

The economic reality for disabled people in developing countries can perhaps be addressed by lessons learned from the study, Neufeldt suggests. "There are a number of strategies persons with disabilities can pursue in income generation programs," he says. "The use of support

services and mechanisms, the pursuit of skills and management training, access to credit or subsidies and the application of sound business practices are all crucial steps."

In order to disseminate these important lessons, the project organized an international conference on income generating activities by and for the disabled, held in Vancouver in 1992. The project has also produced a book and video materials for dubbing in different languages as dissemination tools. As well, representative case-studies of initiatives that have allowed disabled persons to participate in the formal and informal sectors of the economy were analyzed and recorded in a database. These outputs are intended to enable

organizations to support and advocate projects reflecting the most successful types of strategies.

For Aminta, the challenges that lie ahead reflect the situation of many persons with disabilities. Her aspirations include buying sewing equipment and setting up a home business. Faced with little capital and no credit, she knows it will be an uphill struggle to achieve her goal. But working for the MicroLink project in Manila and having access to business training and support services offer her some hope for the future.

Craig Harris



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BUILDINGS THAT TAKE THE HEAT

Fire-related deaths and injuries are increasing at a rate of 20% a year in China, an alarming statistic that is partly owing to the mushrooming of highrise residential buildings in Chinese cities. These highrises are often poorly built fire traps made of highly flammable materials.

New safety standards, however, have been adopted by the Fire Bureau of China's Ministry of Public Security. These standards, the outcome of a joint Chinese-Canadian research project, may help save thousands of lives by enabling the construction of fire-resistant housing.

China's economic reforms have led to increasing urbanization and an accompanying demand for cheap housing. Residential construction has shot up to accommodate this demand; between 1984 and 1985, China experienced a 60% rise in investments in housing construction.

Shenzhen, a city in southeastern China, illustrates the building boom. In 1980, Shenzhen housed a few thousand farmers growing produce for Hong Kong. Today, the population is 2 million. About 300,000 workers live in company-owned highrises. These hastily erected buildings deteriorate in seven to eight years compared with a rate of decline of 40 years in the developed world.

Fires in such buildings spread rapidly through walls and floors, enveloping a structure within minutes. These fires also jump easily to other structures, multiplying the risk of death, injury, and property damage. The most recent Chinese statistics show that in 1990, fire accidents caused 2,100 deaths, 4,700 injuries, and CA\$114 million in damages.

Fire-resistant construction techniques can help reduce the impact of fire accidents. A four-year project, undertaken by China's Tianjin Fire Research Institute (TFRI) and Canada's National Fire Laboratory of the National Research Council, has provided the means for such construction. Researchers in this IDRC-funded project have developed equipment,

Chinese construction site. The huge demand for new housing must be met using fire-resistant construction methods if lives are to be saved.



IDRC: Denis Sing

testing methods, and standards for fire resistance. The goal, said T.T. Lie, Principal Research Officer at the National Fire Laboratory, was to help his Chinese colleagues acquire "all the means to evaluate fire resistance and to carry out further research."

Such research can be easily applied to building safe, affordable housing. "The best approach is to use structural materials for safety and to build structures sufficiently strong to withstand fire," says Kenneth Richardson, Head of the National Fire Laboratory.

UNIQUE FACILITY IN CHINA

Members of the project designed and built furnaces for evaluating the fire resistance of building components such as brick, concrete, and steel. The furnaces simulate fire conditions as well as the weight borne by walls, floor-beam assemblies, and columns in a structure. Project researchers designed and built a new column test furnace at TFRI and upgraded the existing wall and floor-beam furnaces at the institute. With its improved and new capabilities, TFRI is the only facility of its kind in China.

In order to save on expensive furnace testing, researchers devised mathematical models to evaluate the fire resistance of certain columns, slabs, and beams made from commonly used Chinese building materials.

These models provide an alternative to full-scale testing that is cheap, fast, and accurate.

The project has enabled TFRI to establish standards for methods of testing the fire resistance of construction assemblies. These standards are now being implemented by the Fire Bureau of the Ministry of Public Security in China. "(They) give the government a powerful tool to use in fire-safe construction," says Richardson.

In addition to realizing its objectives in fire resistance testing and evaluation, the project provided opportunities for technology transfer and the training of Chinese scientists at Canada's National Fire Laboratory. Moreover, the improved facilities at TFRI will enable Canadian researchers to corroborate their own findings on fire resistance.

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